

APPENDIX H

PRELIMINARY WATER QUALITY MANAGEMENT PLAN



PRELIMINARY
WATER QUALITY MANAGEMENT PLAN (P-WQMP)

BACK BAY LANDING

REDEVELOPMENT PROJECT

Newport Beach, California

Prepared For

*BAYSIDE VILLAGE MARINA, LLC
300 E. COAST HIGHWAY
NEWPORT BEACH, 92660*

Prepared By

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Date Prepared: June 19, 2012
Date Revised: August 9, 2012
Job Number: 1048.01.05

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NEWPORT BEACH, CA

August 9, 2012

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PRELIMINARY WATER QUALITY MANAGEMENT PLAN (P-WQMP)

BACK BAY LANDING

300 E. Coast Highway
City of Newport Beach, County of Orange

PARCEL 3 OF PARCEL MAP BOOK 93-111
APN 440-132-60

Prepared for:

BAYSIDE VILLAGE MARINA, LLC
300 E. COAST HIGHWAY
NEWPORT BEACH, CA 92660

Prepared by:

FUSCOE ENGINEERING, INC.
16795 Von Karman, Suite 100
Irvine, CA 92618
949.474.1960



Date Prepared: June 19, 2012
Revised: August 9, 2012

| PROJECT OWNER'S CERTIFICATION | | | |
|----------------------------------|---|----------------------|---------|
| Permit/Application No.: | PA 2011-216 | Grading Permit No.: | Pending |
| Tract/Parcel Map and Lot(s) No.: | Parcel 3 of Parcel Map 93-111 | Building Permit No.: | Pending |
| Address of Project Site and APN: | 300 E. Coast Highway, Newport Beach, CA 92606 APN 440-132-60 | | |

This Water Quality Management Plan (WQMP) has been prepared for BAYSIDE VILLAGE MARINA, LLC by FUSCOE ENGINEERING, INC. The WQMP is intended to comply with the requirements of the County of Orange NPDES Stormwater Program requiring the preparation of the plan.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan, including the ongoing operation and maintenance of all best management practices (BMPs), and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the current Orange County Drainage Area Management Plan (DAMP) and the intent of the non-point source NPDES Permit for Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the incorporated Cities of Orange County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the WQMP. An appropriate number of approved and signed copies of this document shall be available on the subject site in perpetuity.

| | |
|------------|---|
| OWNER: | |
| Name: | Michael Gelfand |
| Title: | Owner |
| Company: | Bayside Village Marina, LLC |
| Address: | 300 E. Coast Highway, Newport Beach CA 92660 |
| Email: | michaelg@campland.com |
| Telephone: | 858.756.6696 |
| Signature: |  Date: 9/16/12 |

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SECTION I DISCRETIONARY PERMITS AND WATER QUALITY CONDITIONS

| PROJECT INFORMATION | | | |
|--|---|-----------------------|----------------------------------|
| Permit/Application No.: | PA 2011-216 | Tract/Parcel Map No.: | Parcel 3 of Parcel Map 93-111 |
| Address of Project Site and APN: | 300 E. Coast Highway, Newport Beach, CA 92606 APN 440-132-60 | | |
| WATER QUALITY CONDITIONS | | | |
| Discretionary Permit(s): | The Back Bay Landing project, as proposed, will require the preparation, circulation/public review and certification of an Environmental Impact Report to environmentally clear City and Coastal Commission approval of a General Plan Amendment, Coastal Land Use Plan Amendment PC-9 Amendment (Zone Change)/Planned Community Development Plan, Transfer of Development Rights, Lot Line Adjustment, Affordable Housing Implementation Plan (AHIP), and Development Agreement. The project applicant is seeking only the legislative approvals at this time; however, the Back Bay Landing Environmental Impact Report will serve to clear additional “administrative approvals, including issuance of a Coastal Development Permit, Tentative Tract Maps, Coastal Residential Development Permit, and Harbor Permit, as well as other water quality and storm water runoff system clearances/permits. | | |
| Water Quality Conditions: | Conditions of Approval to be provided upon approval of the Legislative Land Use approvals and provided in the Final WQMP. | | |
| WATERSHED-BASED PLAN CONDITIONS | | | |
| Applicable conditions from watershed - based plans including WIHMPs and TMDLs: | Upper Newport Bay TMDLs: <ul style="list-style-type: none">▪ Metals▪ Nutrients▪ Pathogens▪ Pesticides▪ Siltation | | |

SECTION II PROJECT DESCRIPTION

II.1 PROJECT DESCRIPTION

Back Bay Landing encompasses approximately 31 acres in the City of Newport Beach. The project site is located immediately north and east of Coast Highway and is between the Upper Newport Bay Bridge west of Bayside Drive. The Upper Newport Bay is located west and northwest of the site. A Vicinity Map is included in Section VI.

Approximately 6.36-acres of the southwestern portion of Parcel 3 of Parcel Map 93-111 will be redeveloped as part of the project. The entire Parcel 3 (APN 440-132-60) is currently 31.127 acres and encompasses both the landside project site and fee-owned submerged lands (31.43 acres after Lot Line Adjustment). Under existing conditions, Parcel 3 consists of four distinct acreage components:

- A 5.86 acre slightly sloping parcel that is the primary mixed use project area; (this includes the area south of PCH)
- A separate, narrow 0.5 acre strip of land located east of Bayside Village Mobilehome Park, this parcel is also part of the 6.36 acre project development site and will be utilized for access to the existing gravel parking area (not a part of the project), marina and parking/public storage area. This area will undergo the removal of existing garages and be replaced with additional guest parking, tenant storage lockers and upgraded bathroom and laundry facilities. *The proposed improvements for this area are not considered “redevelopment” as they are not anticipated to result in the replacement of existing impervious surfaces. Therefore, this area is not subject to the proposed treatment requirements.*
- A narrow 0.573 acre strip of land providing bayfront access to the existing Bayside Marina boat slips, and an additional 0.086 acre beach area, both areas adjoining the northern boundary of the existing Bayside Village Mobilehome Park, and both small acreages included within the 6.974 acre project site. No development is proposed for these two acreage components so these areas are not subject to the WQMP requirements.
- A 20.797 acre submerged, fee-owned land area surrounded by the 3.655 acre manmade “L” shaped earthen and rip rock “spit” (De Anza Bayside Marsh Peninsula) provides a protected harbor for an existing fifty plus year old private marina. This waterside area is not part of the proposed project.

The 5.86 acre primary project development site currently provides RV and trailered boat storage, Bayside Marina parking, kayak and Stand-Up Paddle Board (SUP) rentals, Marine Service Equipment Storage, and parking/access to Pearson’s Port, a local fish market set on floats in the County tidelands area and Upper Newport Bay channel. Adjoining the southwest portion of the property there is a small Orange County Sanitation District (“OCSD”) pump station that is not a part of Back Bay Landing.

Back Bay Landing will be designed and developed to provide an integrated, mixed-use waterfront project through development of new dry stack storage (the “Boat House”), with visitor-serving retail and recreational marine commercial facilities, as well as a limited amount of attached residential uses. The table below summarizes the proposed project.

| DESCRIPTION OF PROPOSED PROJECT | | | | |
|--|---|---------------------------------|---|-----------------------------------|
| WQMP Development Category: | 8. All significant redevelopment projects, where significant redevelopment is defined as the addition or replacement of 5,000 or more square feet of impervious surface on an already developed site. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of the facility, or emergency redevelopment activity required to protect public health and safety. | | | |
| Project Area: | 31.43 ac (total site) 6.3 ac (total redevelopment; 5.86 acres subject to WQMP treatment requirements) | | | |
| # of Dwelling Units: | 49 units; average of 1,600 sf / unit | | | |
| SIC Code: | 4420 -- Warehousing and Storage (Dry Stack Boat Storage) | | | |
| Narrative Project Description: | <p>The main project area will include a 32,500 square foot full-service dry stack boat storage with enclosed bays, accessible dry stack boat storage facility with approximately 135 boat spaces (the "Boat House"); forty-nine (49) stacked flat residential units totaling approximately 80,000 square feet; and approximately 65,000 square feet of retail/restaurant/marine boat sales, rental and service repair.</p> <p>Located along the eastern property boundary but separated from the main project development is approximately 4,000 sq. ft. of storage (resident and boater lockers) and marina restrooms with laundry facilities. Additionally, a gated entry with 41 parking spaces will provide parking for existing marina tenants and mobile home resident guests. An iconic lighthouse and Lighthouse Plaza visually connects the east and west end of the Landing as the center point of the project.</p> | | | |
| Project Area: | Pervious Area (ac or ft²) | Pervious Area Percentage | Impervious Area (ac or ft²) | Impervious Area Percentage |
| Pre-Project Conditions: | 0.64 ac | 10% | 5.72 | 90% |
| Post-Project Conditions: | 0.95 | 15% | 5.41 | 85% |
| Drainage Patterns/ Connections: | <p>Under existing conditions, runoff generally flows west and north towards the Upper Newport Bay. Runoff from the eastern-most portion of the redevelopment project site drains to an existing 30" storm drain that runs along the southern portion of the site and discharges to the Bay west of the site. Runoff from the western portion of the site also drains to this storm drain line. Runoff from the central portion of the site drains north to an existing outlet located north of the site.</p> <p>Under proposed conditions, runoff will continue to flow similar to existing conditions, and discharging at these two existing outlets.</p> | | | |

| PROJECT FEATURES | |
|---|---|
| Building Summary: | <p>The main project area (5.86 acres subject to WQMP treatment requirements) will include a 32,500 square foot full-service dry stack boat storage with enclosed bays, accessible dry stack boat storage facility with approximately 135 boat spaces (the "Boat House"); forty-nine (49) stacked flat residential units totaling approximately 80,000 square feet; and approximately 65,000 square feet of retail/restaurant/marine boat sales, rental and service repair.</p> <p>Of a total of 49 residential units, 31 units will be designed and integrated in two levels of residential over ground floor commercial retail, wrapped around a 3-level semi-subterranean parking structure. In addition, there will be 18 units in a three level structure adjacent to the northwest bayfront. All Back Bay Landing units are proposed to be designed and constructed as individual stacked flats. The units will vary in size (square footage) and number of bedrooms. Separate retail and restaurant buildings are also proposed adjacent to N. Bayside Drive to make up the remaining 65,000 square feet of visitor-serving retail and restaurants. Further details will be provided in the Final WQMP.</p> <p>Two other proposed buildings include the parking structure and the dry stack storage facility.</p> |
| Landscaped Areas & Parking Facilities: | <p>Landscaping will be provided throughout the project site in the form of planters adjacent to the buildings and as parking lot islands, along street frontages and around the perimeter of the project site. Approximately 15% of the site will be landscaped. Further details on proposed landscaping will be provided in the Final WQMP.</p> <p>Parking will be provided mainly within the parking structure with some surface parking areas throughout the site. 99 surface parking spaces are contained within the main 6.3 acre project area, and 41 surface spaces are located on the east side of the project (former storage garages). 358 spaces will be located within the parking structure.</p> |

| | |
|---|---|
| Project Features: | <p>The dry stack boat storage is designed as an enclosed “boat house,” which can store 135+ boats of mixed sizes. An innovative storage racking system will allow maximum flexibility for vessel heights and lengths. A small water inlet with an innovative retractable pedestrian bridge is proposed to facilitate the storage and launching of boats housed within the dry stack boat storage facilities.</p> <p>With the removal of the existing 50-year old residential public storage garages (4,500± sq. ft. of buildings) at the eastern side of Parcel 3, new enclosed storage facilities (marina boating lockers), marina guest bathrooms with laundry facilities and additional marina parking and mobile home community guest parking is to be provided with decorative 8 ft. property walls and landscaping.</p> <p>An appropriate number of trash enclosures will be located within the project site. Specific number and locations of the trash enclosures will be documented in the Final WQMP. Trash enclosures will either be located indoors or will be covered and walled on 3 sides to preclude rainfall and runoff (gate comprising the fourth side). Any food preparation areas associated with the proposed restaurant land uses will be handled indoors, and the eating area tables will be covered with a canopy and designed to preclude precipitation and runoff. Grease interceptors will be located in the sanitary sewer systems where applicable. Further details will be provided in the Final WQMP.</p> |
| Outdoor Activities, Materials Stored & Wastes Generated: | <p>Materials used and stored on-site will include those associated with residential, commercial/retail and recreational land uses, such as normal cleaning supplies, maintenance materials, office supplies, and retail inventory. Materials will be stored within the buildings.</p> |

II.2 POTENTIAL STORM WATER POLLUTANTS

The table below, derived from Table 2 of the Countywide Model WQMP Technical Guidance Document (May 2011), summarizes the categories of land use or project features of concern and the general pollutant categories associated with them.

| ANTICIPATED & POTENTIAL POLLUTANTS GENERATED BY LAND USE TYPE | | | | | | | | |
|--|------------------------------|------------------|------------------|-----------------------------|------------------|------------------|-------------------------|----------------|
| Priority Project Categories and/or Project Features | General Pollutant Categories | | | | | | | |
| | Suspended Solid/ Sediments | Nutrients | Heavy Metals | Pathogens (Bacteria/ Virus) | Pesticides | Oil & Grease | Toxic Organic Compounds | Trash & Debris |
| Detached Residential Development | E | E | N | E | E | E | N | E |
| Attached Residential Development | E | E | N | E | E | E ⁽²⁾ | N | E |
| Commercial/Industrial Development | E ⁽¹⁾ | E ⁽¹⁾ | E ⁽⁵⁾ | E ⁽³⁾ | E ⁽¹⁾ | E | E | E |
| Automotive Repair Shops | N | N | E | N | N | E | E | E |
| Restaurants | E ⁽¹⁾⁽²⁾ | E ⁽¹⁾ | E ⁽²⁾ | E | E ⁽¹⁾ | E | N | E |
| Hillside Development >5,000 ft ² | E | E | N | E | E | E | N | E |
| Parking Lots | E | E ⁽¹⁾ | E | E ⁽⁴⁾ | E ⁽¹⁾ | E | E | E |
| Streets, Highways, & Freeways | E | E ⁽¹⁾ | E | E ⁽⁴⁾ | E ⁽¹⁾ | E | E | E |
| Retail Gasoline Outlets | N | N | E | N | N | E | E | E |
| <p>Notes:</p> <p>E = expected to be of concern N = not expected to be of concern</p> <p>(1) Expected pollutant if landscaping exists on-site, otherwise not expected.</p> <p>(2) Expected pollutant if the project includes uncovered parking areas, otherwise not expected.</p> <p>(3) Expected pollutant if land use involves food or animal waste products, otherwise not expected.</p> <p>(4) Bacterial indicators are routinely detected in pavement runoff.</p> <p>(5) Expected if outdoor storage or metal roofs, otherwise not expected.</p> <p>Source: County of Orange. (2011, May 19). Technical Guidance Document for the Preparation of Conceptual/ Preliminary and/or Project Water Quality Management Plans (WQMPs). Table 2.1.</p> | | | | | | | | |

| POLLUTANTS OF CONCERN | | |
|-------------------------------|--|-------------------------------------|
| Pollutant | E = Expected to be of concern N = Not Expected to be of concern | Additional Information and Comments |
| Suspended Solid/ Sediment | E | 303(d) listed impairment / TMDL |
| Nutrients | E | 303(d) listed impairment / TMDL |
| Heavy Metals | E | 303(d) listed impairment / TMDL |
| Pathogens (Bacteria/Virus) | E | 303(d) listed impairment / TMDL |
| Pesticides | E | 303(d) listed impairment / TMDL |
| Oil & Grease | E | |
| Toxic Organic Compounds | E | |
| Trash & Debris | E | |

II.3 HYDROLOGIC CONDITIONS OF CONCERN

The purpose of this section is to identify any hydrologic conditions of concern (HCOC) with respect to downstream flooding, erosion potential of natural channels downstream, impacts of increased flows on natural habitat, etc. As specified in Section 2.3.3 of the 2011 Model WQMP, projects must identify and mitigate any HCOCs. A HCOC is a combination of upland hydrologic conditions and stream biological and physical conditions that presents a condition of concern for physical and/or biological degradation of streams.

In the North Orange County permit area, HCOCs are considered to exist if any streams located downstream from the project are determined to be potentially susceptible to hydromodification impacts and either of the following conditions exists:

- Post-development runoff volume for the 2-yr, 24-hr storm exceeds the pre-development runoff volume for the 2-yr, 24-hr storm by more than 5 percent

or

- Time of concentration (T_c) of post-development runoff for the 2-yr, 24-hr storm event exceeds the time of concentration of the pre-development condition for the 2-yr, 24-hr storm event by more than 5 percent.

If these conditions do not exist or streams are not potentially susceptible to hydromodification impacts, an HCOC does not exist and hydromodification does not need to be considered further. In the North Orange County permit area, downstream channels are considered not susceptible to

hydromodification, and therefore do not have the potential for a HCOC, if all downstream conveyance channels that will receive runoff from the project are engineered, hardened, and regularly maintained to ensure design flow capacity, and no sensitive habitat areas will be affected.

Is the proposed project potentially susceptible to hydromodification impacts?

☐ Yes ☒ No (show map)

The project site is located adjacent to the Upper Newport Bay, a tidally influenced area. Figure XVI-3d of the Technical Guidance Document (May 2011) demonstrates that the project location does not fall within an area susceptible to hydromodification. In addition, due to the nature of the high imperviousness associated with the existing conditions, proposed runoff rates will remain consistent or decrease due to the minor increase in landscaping under the proposed condition. A copy of Figure XVI-3d is included in Appendix A.

II.4 POST DEVELOPMENT DRAINAGE CHARACTERISTICS

Under existing conditions, runoff generally flows west and north towards the Upper Newport Bay. Runoff from the eastern-most portion of the redevelopment project site drains to an existing 30" storm drain that runs along the southern portion of the site and discharges to the Bay west of the site. Runoff from the western portion of the site also drains to this storm drain line. Runoff from the central portion of the site drains north to an existing outlet located north of the site.

Under proposed conditions, runoff will continue to flow similar to existing conditions. New on-site storm drains and area drains will be constructed, and will connect to the existing storm drains and continue to outlet to the Bay at the two existing outlets.

II.5 PROPERTY OWNERSHIP/MANAGEMENT

| PROPERTY OWNERSHIP/MANAGEMENT | |
|-------------------------------|--|
| Public Streets: | City of Newport Beach |
| Private Streets: | POA |
| Landscaped Areas: | POA |
| Open Space: | None proposed. |
| Easements: | City of Newport Beach Orange County Sanitation District |
| Parks: | None proposed |
| Buildings: | POA |
| Structural BMPs: | POA |

A Property Owners Association (POA) will be formed upon project completion. The POA will be responsible for inspecting and maintaining all BMPs prescribed for Back Bay Landing. Until a POA is formally established, Bayside Village Marina, LLC shall assume all BMP maintenance and inspection responsibilities for the proposed project. Inspection and maintenance responsibilities are outlined in Section V of this report.

SECTION III SITE DESCRIPTION

III.1 PHYSICAL SETTING

| | |
|---|---|
| Planning Area/ Community Name: | Back Bay Landing |
| Address: | 300 E. Coast Highway, Newport Beach, CA 62660 |
| Project Area Description: | The project site is located immediately north and east of Coast Highway and is between the Upper Newport Bay Bridge west of Bayside Drive. The Upper Newport Bay is located west and northwest of the site. |
| Land Use: | Recreational and Marine Commercial CM.5 (N of PCH) and CM.3 (S of PCH) Statistical Area K-1 (north of PCH); G-1 (south of PCH) |
| Zoning: | PC-9 |
| Acreage: | 31.43 ac (total site) 6.3 ac (total redevelopment); 5.86 acres subject to WQMP treatment requirements |
| Predominant Soil Type: | D |
| Impervious Conditions: | Existing: 90% Proposed: 85% |

III.2 SITE CHARACTERISTICS

| | |
|---|--|
| Precipitation Zone: | 0.7 inches design capture storm depth |
| Topography: | The project site is relatively flat, gently sloping west towards the Bay. Under existing conditions, the redevelopment portion of the site is currently a paved parking lot. |
| Drainage Patterns/Connections: | <p>Under existing conditions, runoff generally flows west and north towards the Upper Newport Bay. Runoff from the eastern-most portion of the redevelopment project site drains to an existing 30" storm drain that runs along the southern portion of the site and discharges to the Bay west of the site. Runoff from the western portion of the site also drains to this storm drain line. Runoff from the central portion of the site drains north to an existing outlet located north of the site.</p> <p>Under proposed conditions, runoff will continue to flow similar to existing conditions. New on-site storm drains and area drains will be constructed, and one system will connect to the existing 30" line while the other will discharge through a new proposed outlet along the northern bulkhead.</p> |

| | |
|--|---|
| Soil Type, Geology, and Infiltration Properties: | Soils on-site generally consist of fill to depths that varied from approximately 6 to 8 feet below existing grade. The fill encountered consisted of predominately fine grained sands that exhibited loose to medium relative density. The fill is underlain by native soils comprised of Quaternary estuarine deposits consisting of loose to medium dense relative density sands and silty sands to a depth of 20 to 25 feet, which were underlain by medium dense to dense sands extending to at least depths explored. The native soils included a 1-3 foot thick layer of soft consistency clay at depths ranging from 8 to 10 feet below grade. |
| Hydrogeologic (Groundwater) Conditions: | Groundwater was encountered at depths of approximately 6-8 feet below grade during field exploration in 2009. Due to the coastal location of the project site, groundwater levels will vary in response to tidal fluctuations. |
| Geotechnical Conditions (relevant to infiltration): | Due to the presence of shallow groundwater, on-site infiltration of storm water runoff is considered infeasible. In addition, the subject site is located in an area that has been identified as being potentially susceptible to liquefaction. |
| Off-Site Drainage: | The project site receives runoff from a small off-site drainage area associated with the mobile home park on the east side of N. Bayside Drive. Flows enter the project site on the east side and flow west into the existing 12" storm drain adjacent to the pump station. In the proposed condition, the project will continue to accept these flows. Project flows and off-site flows will be co-mingled after project flows have been treated. |
| Utility and Infrastructure Information: | <p>The existing OCSD sewer pump station located adjacent to the property off PCH will remain, and is not-a-part of the project.</p> <p>The Back Bay Landing project, as proposed, will require utility relocations and new on-site systems to provide utility services to the proposed land uses. One significant feature is the existing 30" water transmission line that runs diagonally across the length of the existing parking lot to an existing vault on the property adjacent to the water. The line will be abandoned/removed and relocated north or south of the project to minimize conflicts between the line and the proposed land uses.</p> <p>In addition, development of the property will require updating existing wet and dry utilities including storm drain, water sewer, electric, gas and fiber optics. Utility alignments for sewer, water and storm drain will be proposed in conformance with City standards as part of the EIR process.</p> |

III.3 WATERSHED DESCRIPTION

| | |
|--|---|
| Receiving Waters: | Upper Newport Bay |
| 303(d) Listed Impairments: | <div>Upper Newport Bay:</div> <ul style="list-style-type: none"> ▪ Chlordane ▪ Copper ▪ DDT ▪ Indicator Bacteria ▪ metals ▪ nutrients ▪ PCBs ▪ Pesticides ▪ Sediment Toxicity ▪ Sedimentation/ Siltation <div>Lower Newport Bay:</div> <ul style="list-style-type: none"> ▪ Chlordane ▪ Copper ▪ DDT ▪ Indicator Bacteria ▪ Nutrients ▪ PCBs ▪ Pesticides ▪ Sediment Toxicity |
| Applicable TMDLs: | <div>Upper Newport Bay:</div> <ul style="list-style-type: none"> ▪ Metals ▪ Nutrients ▪ Pathogens ▪ Pesticides ▪ Siltation <div>Lower Newport Bay:</div> <ul style="list-style-type: none"> ▪ Metals ▪ Nutrients ▪ Pathogens ▪ Pesticides ▪ Priority Organics ▪ Siltation |
| Pollutants of Concern for the Project: | <p>Per Section II.2:</p> <ul style="list-style-type: none"> ▪ Suspended Solids/Sediment ▪ Nutrients ▪ Heavy Metals ▪ Pathogens (Bacteria/Virus) ▪ Pesticides ▪ Oil & Grease ▪ Toxic Organic Compounds ▪ Trash & Debris |
| Hydrologic Conditions of Concern (HCOCs): | Refer to Section II.3 |
| Environmentally Sensitive and Special Biological Significant Areas: | <p>Runoff from the project site is located adjacent to and ultimately discharges into the Upper Newport Bay, which is impaired on the 303(d) list. Therefore the project site is located in an Environmentally Sensitive Area (ESA) according to the OC DAMP. The project site is not located in an Area of Special Biological Significance (ASBS) according to the State Water Resources Control Board. The waterfront areas along the west and northwest project boundary are subject to CA Coastal Commission jurisdiction.</p> |

SECTION IV BEST MANAGEMENT PRACTICES (BMPs)

IV.1 PROJECT PERFORMANCE CRITERIA

Is there an approved WIHMP or equivalent for the project area that includes more stringent LID feasibility criteria or if there are opportunities identified for implementing LID on regional or sub-regional basis?

☐ Yes ☒ No

| PROJECT PERFORMANCE CRITERIA | |
|--|---|
| Hydromodification Control Performance Criteria (Model WQMP Section 7.II-2.4.2.2) | <p>If a hydrologic condition of concern (HCO) exists, priority projects shall implement onsite or regional hydromodification controls such that:</p> <ul style="list-style-type: none"> Post-development runoff volume for the two-year frequency storm does not exceed that of the predevelopment condition by more than five percent, and Time of concentration of post-development runoff for the two-year storm event is not less than that for the predevelopment condition by more than five percent. <p>The project site is not located in an area susceptible to hydromodification impacts (see Figure XVI-3d in Appendix A).</p> |
| LID Performance Criteria (Model WQMP Section 7.II-2.4.3) | <p>Infiltrate, harvest and use, evapotranspire, or biotreat/biofilter, the 85th percentile, 24-hour storm event (Design Capture Volume). LID BMPs must be designed to retain, on-site, (infiltrate, harvest and use, or evapotranspire) storm water runoff up to 80 percent average annual capture efficiency</p> |
| Treatment Control BMP Performance Criteria (Model WQMP Section 7.II-3.2.2) | <p>If it is not feasible to meet LID performance criteria through retention and/or biotreatment provided on-site or at a sub-regional/regional scale, then treatment control BMPs shall be provided on-site or offsite prior to discharge to waters of the US. Sizing of treatment control BMP(s) shall be based on either the unmet volume after claiming applicable water quality credits, if appropriate.</p> |
| LID Design Storm Capture Volume | <p>5.86 acres; 90% imperviousness (conservative estimate) 12,358.9 ft³</p> |

IV.2 SITE DESIGN AND DRAINAGE PLAN

The following section describes the site design BMPs used in this project and the methods used to incorporate them. Careful consideration of site design is a critical first step in storm water pollution prevention from new developments and redevelopments.

IV.2.1 Site Design BMPs

Minimize Impervious Area

Impervious surfaces have been minimized by incorporating landscaped areas throughout the site including common areas, parking lot islands, medians and larger courtyard areas. The streets and sidewalks will be designed with minimum width requirements to minimize impervious surfaces where feasible.

Maximize Natural Infiltration Capacity

Due to the presence of high, tidally influenced groundwater within the vicinity of the project, infiltration of runoff will not be utilized on-site.

Preserve Existing Drainage Patterns and Time of Concentration

Runoff patterns and flow rates will be consistent with existing conditions and continue to discharge to the bay utilizing existing outlets or new outlets placed in similar locations.

Disconnect Impervious Areas

Landscaping will be incorporated throughout the site as planters in common areas, parking lot islands, adjacent to buildings, and around the site perimeter. Runoff will drain to landscaped bioretention areas for filtration and treatment prior to discharging off-site.

Protect Existing Vegetation and Sensitive Areas, and Revegetate Disturbed Areas

The project site is developed under existing conditions. All disturbed areas will be paved or landscaped with native and/or tolerant landscaping consistent with City and CA Coastal Commission Guidelines.

Xeriscape Landscaping

Native and/or tolerant landscaping will be incorporated into the site design consistent with City and CA Coastal Commission guidelines.

IV.2.2 Drainage Management Areas

In accordance with the MS4 permit and the new Model WQMP, the Design Capture Volumes (DCVs) presented in the following table represent the minimum volume of storm water runoff required to be treated by LID and/or treatment control BMPs for the proposed project. The total DCV noted in the table represents the treatment requirement for all of the development areas. Preliminary footprints and depths required by each BMP are summarized in the following sections. Detailed calculations are provided in Appendix A.

| DRAINAGE MANAGEMENT AREAS | | | | | | | | |
|---------------------------|--------------------|--------------|--------------------|--|-------------------------|----------------------------------|------------------------|--------------------------|
| Drainage Area or BMP Name | Drainage Area (ac) | % impervious | Runoff Coefficient | Design Storm Depth ⁽¹⁾ (in) | Average 2-year Tc (min) | Intensity ⁽²⁾ (in/hr) | DCV (ft ³) | Q _{Treat} (cfs) |
| A1 | 0.94 | 90% | 0.83 | 0.7 | 10 | 0.23 | 1,982.5 | 0.18 |
| A1.1 | 0.12 | 85% | 0.79 | 0.7 | 10 | 0.23 | 240.9 | 0.02 |
| A2 | 2.4 | 95% | 0.86 | 0.7 | 10 | 0.23 | 5,244.6 | 0.47 |
| A3 | 2.4 | 90% | 0.83 | 0.7 | 10 | 0.23 | 5,061.7 | 0.46 |
| TOTAL | 5.86 | 90% | 0.83 | 0.7 | 10 | 0.23 | 12,358.9 | 1.12 |

Notes:
1. Per Figure XVI-1 of the Model WQMP Technical Guidance Document (2011, May 19). See also Appendix A.
2. Per Figure III.4 of the Model WQMP Technical Guidance Document (2011, May 19). See also Appendix A.

IV.3 LID BMP SELECTION AND PROJECT CONFORMANCE ANALYSIS

Low Impact Development (LID) BMPs are required in addition to site design measures and source controls to reduce pollutants in storm water discharges. LID BMPs are engineered facilities that are designed to retain or biotreat runoff on the project site. The 4th Term MS4 Storm Water Permit (Order R9-2009-0009) requires the evaluation and use of LID features using the following hierarchy of treatment: infiltration, evapotranspiration, harvest/reuse, and biotreatment. The following sections summarize the LID BMPs proposed for the project in accordance with the permit hierarchy and performance criteria outlined in Section IV.1.

IV.3.1 Hydrologic Source Controls (HSCs)

Hydrologic source controls (HSCs) can be considered to be a hybrid between site design practices and LID BMPs. HSCs are distinguished from site design BMPs in that they do not reduce the tributary area or reduce the imperviousness of a drainage area; rather they reduce the runoff volume that would result from a drainage area with a given imperviousness compared to what would result if HSCs were not used.

| HYDROLOGIC SOURCE CONTROLS | | |
|----------------------------|--|--------------------------|
| ID | Name | Included? |
| HSC-1 | Localized on-lot infiltration | <input type="checkbox"/> |
| HSC-2 | Impervious area dispersion (e.g. roof top disconnection) | <input type="checkbox"/> |
| HSC-3 | Street trees (canopy interception) | <input type="checkbox"/> |
| HSC-4 | Residential rain barrels (not actively managed) | <input type="checkbox"/> |
| HSC-5 | Green roofs/Brown roofs | <input type="checkbox"/> |
| HSC-6 | Blue roofs | <input type="checkbox"/> |

| HYDROLOGIC SOURCE CONTROLS | | |
|----------------------------|--|--------------------------|
| ID | Name | Included? |
| HSC-7 | Impervious area reduction (e.g. permeable pavers, site design) | <input type="checkbox"/> |

HSC's will be accounted for during final design and the cumulative volume of the HSC's will be subtracted from the required treatment volume in the Final WQMP.

IV.3.2 Infiltration BMPs

Infiltration BMPs are LID BMPs that capture, store and infiltrate storm water runoff. These BMPs are engineered to store a specified volume of water and have no design surface discharge (underdrain or outlet structure) until this volume is exceeded. Examples of infiltration BMPs include infiltration trenches, bioretention without underdrains, drywells, permeable pavement, and underground infiltration galleries.

| INFILTRATION | | |
|----------------|-----------------------------------|--------------------------|
| ID | Name | Included? |
| INF-3 INF-4 | Bioretention Without Underdrains | <input type="checkbox"/> |
| | Rain Gardens | <input type="checkbox"/> |
| | Porous Landscaping | <input type="checkbox"/> |
| | Infiltration Planters | <input type="checkbox"/> |
| | Retention Swales | <input type="checkbox"/> |
| INF-2 | Infiltration Trenches | <input type="checkbox"/> |
| INF-1 | Infiltration Basins | <input type="checkbox"/> |
| INF-5 | Drywells | <input type="checkbox"/> |
| INF-7 | Subsurface Infiltration Galleries | <input type="checkbox"/> |
| -- | French Drains | <input type="checkbox"/> |
| INF-6 | Permeable Asphalt | <input type="checkbox"/> |
| | Permeable Concrete | <input type="checkbox"/> |
| | Permeable Concrete Pavers | <input type="checkbox"/> |
| | Other: | <input type="checkbox"/> |

Due to the presence of shallow groundwater, on-site infiltration of storm water runoff is considered infeasible. In addition, the subject site is located in an area that has been identified as being potentially susceptible to liquefaction. Further, the native soils included a 1-3 foot thick layer of soft consistency clay at depths ranging from 8 to 10 feet below grade that restricts infiltration. Therefore, infiltration BMPs will not be utilized on-site.

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

Evapotranspiration BMPs are a class of retention BMPs that discharges stored volume predominately to ET, though some infiltration may occur. ET includes both evaporation and transpiration, and ET BMPs may incorporate one or more of these processes. BMPs must be designed to achieve the maximum feasible ET, where required to demonstrate that the maximum amount of water has been retained on-site. Since ET is not the sole process in these BMPs, specific design and sizing criteria have not been developed for ET-based BMPs.

| EVAPOTRANSPIRATION | | |
|--------------------|---------------------------------------|-------------------------------------|
| ID | Name | Included? |
| -- | HSCs, see Section IV.3.1 | <input type="checkbox"/> |
| -- | Surface-based infiltration BMPs | <input type="checkbox"/> |
| -- | Biotreatment BMPs, see Section VI.3.4 | <input checked="" type="checkbox"/> |
| | Other: | <input type="checkbox"/> |

Bioretention BMPs are proposed which utilize evapotranspiration as physical process for runoff volume reduction. Bioretention BMPs are described further in Section IV.3.4.

Harvest and use (aka. Rainwater Harvesting) BMPs are LID BMPs that capture and store storm water runoff for later use. These BMPs are engineered to store a specified volume of water and have no design surface discharge until this volume is exceeded. Harvest and use BMPs include both above-ground and below-ground cisterns. Examples of uses for harvested water include irrigation, toilet and urinal flushing, vehicle washing, evaporative cooling, industrial processes and other non-potable uses.

| HARVEST & REUSE / RAINWATER HARVESTING | | |
|--|----------------------------------|--------------------------|
| ID | Name | Included? |
| HU-1 | Above-ground cisterns and basins | <input type="checkbox"/> |
| HU-2 | Underground detention | <input type="checkbox"/> |
| -- | Other: | <input type="checkbox"/> |

In order to quantify harvested water demand for the common areas of the project, the Modified Estimated Applied Water Use (EAWU) method was used, consistent with Appendix X of the Model WQMP's Technical Guidance Document (TGD), dated May 19, 2011.

The Modified EAWU method is modified from the OC Irrigation Code (County Ordinance No. 09-010) to account for the wet season demand and storm events (assuming that no irrigation would be applied for approximately 30% of the days in the wet season).

The equation used to calculate the Modified EAWU is:

$$\text{Modified EAWU} = \frac{(ET_{o_{wet}} \times K_L \times LA \times 0.015)}{IE}$$

Where:

Modified EAWU = estimated daily average water use during wet season

ET_{o_{wet}} = average reference ET from November through April (inches per month) per Table X.2 of the TGD

K_L = landscape coefficient (Table X.4 of the TGD)

LA = landscape area irrigated with harvested water (square feet)

IE = irrigation efficiency (assumed at 90%)

Note: In the equation, the coefficient (0.015) accounts for unit conversions and shut down of irrigation during and for three days following a significant precipitation event.

For a system to be considered “feasible”, the system must be designed with a storage volume equal to the DCV from the tributary area and achieve more than 40% capture. The system must also be able to drawdown in 30 days to meet the 40% capture value. In addition, Table X.6 of the Technical Guidance Document sets forth the demand thresholds for minimum partial capture.

| TABLE X.6: HARVESTED WATER DEMAND THRESHOLDS FOR MINIMUM PARTIAL CAPTURE | |
|--|---|
| Design Capture Storm Depth, inches | Wet Season Demand Required for Minimum Partial Capture, gpd per impervious acre |
| 0.60 | 490 |
| 0.65 | 530 |
| 0.70 | 570 |
| 0.75 | 610 |
| 0.80 | 650 |
| 0.85 | 690 |
| 0.90 | 730 |
| 0.95 | 770 |
| 1.00 | 810 |

The following table summarizes the estimated applied water use for the common area landscaping of the project. Although specific details on landscaped areas are not available at this time, irrigation demands can be estimated based on typical landscaping for similar mixed use types of development (~85% to 90% imperviousness). Based on the City landscaping requirements, native and/or drought tolerant landscaping will comprise the majority of the plant palette, and therefore “conservation” landscaping was utilized for the preliminary demand calculations. Detailed calculations are provided in Appendix A.

| ESTIMATED APPLIED WATER USE (EAWU) FOR COMMON AREA LANDSCAPING | | | | | | | | | |
|---|-----------------|--------------|---------------------------|------------------------|---|-------------------------------|---------------------|--|---|
| Landscape Type | Total Area (ac) | % Impervious | Impervious Tributary (ac) | Irrigated LS Area (ac) | ET _{owet} ⁽¹⁾ (in/mo) | K _L ⁽²⁾ | Modified EAWU (gpd) | Modified EAWU per impervious acre (gpd/ac) | Minimum Capture Threshold ⁽³⁾ (gpd/ac) |
| Conservation | 5.86 | 90% | 5.27 | 0.59 | 2.75 | 0.35 | 409.48 | 77.64 | 570 |
| Design Capture Volume (gal) | | | | 92,445 | Drawdown (days) | | | | 225.8 |
| Notes: | | | | | | | | | |
| 1 Per Table X.2 for Laguna Beach Region (similar climate type), Model WQMP Technical Guidance Document, dated May 19, 2011. | | | | | | | | | |
| 2 Per Table X.4 of the Model WQMP Technical Guidance Document, dated May 19, 2011. | | | | | | | | | |
| 3 Per Table X.6 of Model WQMP Technical Guidance Document, dated May 19, 2011. | | | | | | | | | |

Based on the results of the minimum threshold analysis, harvest and use for landscaping is not considered feasible, as the irrigation demand is insufficient to meet the minimum harvest demand threshold. The captured DCV would not be able to drawdown in 30 days required for feasibility. Similarly, the resultant irrigated area to tributary impervious area is below the minimum threshold for capture feasibility.

IV.3.4 Biotreatment BMPs

Biotreatment BMPs are a broad class of LID BMPs that reduce storm water volume to the maximum extent practicable, treat storm water using a suite of treatment mechanisms characteristic of biologically active systems, and discharge water to the downstream storm drain system or directly to receiving waters. Treatment mechanisms include media filtration (though biologically-active media), vegetative filtration (straining, sedimentation, interception, and stabilization of particles resulting from shallow flow through vegetation), general sorption processes (i.e., absorption, adsorption, ion-exchange, precipitation, surface complexation), biologically-mediated transformations, and other processes to address both suspended and dissolved constituents. Examples of biotreatment BMPs include bioretention with underdrains, vegetated swales, constructed wetlands, and proprietary biotreatment systems.

| BIOTREATMENT | | |
|--------------|--|-------------------------------------|
| ID | Name | Included? |
| BIO-1 | Bioretention with underdrains | <input checked="" type="checkbox"/> |
| | Storm Water planter boxes with underdrains | <input checked="" type="checkbox"/> |
| | Rain gardens with underdrains | <input type="checkbox"/> |
| BIO-5 | Constructed wetlands | <input type="checkbox"/> |
| BIO-2 | Vegetated swales | <input type="checkbox"/> |
| BIO-3 | Vegetated filter strips | <input type="checkbox"/> |
| BIO-7 | Proprietary vegetated biotreatment systems | <input checked="" type="checkbox"/> |
| BIO-4 | Wet extended detention basin | <input type="checkbox"/> |
| BIO-6 | Dry extended detention basins | <input type="checkbox"/> |
| -- | Other: | <input type="checkbox"/> |

Since both infiltration and harvest and reuse are considered infeasible, biotreatment BMPs will be utilized on-site for water quality treatment. A combination of proprietary bioretention units (Filterra® or equivalent) and biofiltration cells with underdrains integrated within the landscaping areas (where feasible) and will filter/treat runoff from the proposed buildings and hardscape prior to discharging into the storm drain system. These systems were selected based on their ability to treat the project's pollutants of concerns to a medium or high effectiveness, in accordance with Table 4.2 of the Model WQMP Technical Guidance Document.

Filterra® units by Kristar are structural media filtration device that also utilize bioretention processes for storm water treatment (functional equivalents are also acceptable). Filterra units feature a specially designed media filter mixture within a below-grade concrete box. One tree or large shrub is planted within the media to provide additional pollutant removal, and function similar to bioretention cells. The filter media is designed to capture and filter pollutants during the first-flush storm event, while biological processes degrade, metabolize, detoxify, and volatilize the pollutants during and between storms.

Bioretention cells with underdrains are plant-based biotreatment systems that typically consist of a ponding area, mulch layer, planting soils and plants. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded and sequestered by the soil and plants. Underdrains collect the treated water and return it back into the storm drain system.

In accordance with the Model WQMP, the biotreatment BMPs will be sized to capture and treat the volume of runoff produced from a 24-hour, 85th percentile storm event (termed Design Capture Volume [DCV]). The DCV is determined by the following equation:

$$DCV = C \times d \times A \times 43,560 \frac{sf}{ac} \times \frac{1}{12} ft/in$$

Where:

DCV = runoff volume during the design storm event (cubic feet)
 C = runoff coefficient, where $C = (0.75 \times imp + 0.15)$
 imp = impervious fraction of drainage area
 d = design capture storm depth per Figure XVI-1 of the Model WQMP
 A = tributary area (acres)

To calculate a flow rate (Q) associated with a water quality design storm intensity:

$$Q = C \times i_{design} \times A$$

Where:

Q = design flow rate (cfs)
 C = runoff coefficient, where $C = (0.75 \times imp + 0.15)$
 imp = impervious fraction of drainage area
 i_{design} = design intensity based on time of concentration (T_c) per Model WQMP Figure III.4
 A = tributary area (acres)

Calculations for the bioretention units are summarized in the following tables. Detailed calculations are provided in Appendix A. In the event biofiltration enhancements within the programmed landscaping are not feasible for a particular drainage area, Filterra Units (or equivalent) will be implemented within the storm drain system for those areas. The use of Filterra Units in lieu of harvest and use and/or bioretention landscaping is an acceptable alternative BMP based on prior entitlements received by the proposed project. Further details on design of the LID BMPs will be provided in the Final WQMP. Maintenance requirements and frequencies for the LID BMPs are discussed in Section V (BMP Inspection & Maintenance) of this report.

| BIOTREATMENT BMP DESIGN SUMMARY | | | | | | | |
|---|--------------|-----------------------|---------------------------------------|------------------------|-----------------------------------|--------------------------|---|
| Drainage Area Name | % impervious | Drainage Area (acres) | DCV ⁽¹⁾ (ft ³) | Q ⁽¹⁾ (cfs) | Filterra Proprietary Biotreatment | | Bioretention Cells Alternative BMP ⁽²⁾ |
| | | | | | Minimum Unit Size Needed | Total Treatment Provided | Minimum Surface Area Needed (ft ²) |
| A1 | 90% | 0.94 | 1,982.5 | 0.18 | 2 units 8'x6' each | 0.22 cfs | 495.6 |
| A1.1 | 85% | 0.12 | 240.9 | 0.02 | 1 unit 4'x4' | 0.037 cfs | 60.2 |
| A2 | 95% | 2.40 | 5,244.6 | 0.47 | 3 units 6'x12' each | 0.5 cfs | 1,311.2 |
| A3 | 90% | 2.40 | 5,061.7 | 0.46 | 3 units 6'x12' each | 0.5 cfs | 1,265.4 |
| Notes: | | | | | | | |
| 1. Detailed calculations are provided in Appendix A. | | | | | | | |
| 2. Per 80% Capture Efficiency Method. See calculations in Appendix A. | | | | | | | |

IV.3.5 Hydromodification Control BMPs

As identified in Section II.3, the project site is not located in an area susceptible to hydromodification impacts. No additional hydromodification control BMPs are required.

IV.3.6 Regional/Sub-Regional LID BMPs

Not applicable. LID BMPs will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this Section.

IV.3.7 Treatment Control BMPs

Treatment control BMPs can only be considered if the project conformance analysis indicates that it is not feasible to retain the full design capture volume with LID BMPs.

| TREATMENT CONTROL BMPs | | |
|------------------------|--------------------------------|--------------------------|
| ID | Name | Included? |
| TRT-1 | Sand Filters | <input type="checkbox"/> |
| TRT-2 | Cartridge Media Filter | <input type="checkbox"/> |
| PRE-1 | Hydrodynamic Separation Device | <input type="checkbox"/> |
| PRE-2 | Catch Basin Insert | <input type="checkbox"/> |
| | Other: | <input type="checkbox"/> |

Not applicable at this time. It is anticipated that LID BMPs will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this Section.

IV.3.8 Non-Structural Source Control BMPs

The table below indicates all BMPs to be incorporated in the project. For those designated as not applicable (N/A), a brief explanation why is provided.

| NON-STRUCTURAL SOURCE CONTROL BMPs | | | | |
|------------------------------------|--|-------------------------------------|--------------------------|---|
| ID | Name | Included? | Not Applicable? | If Not Applicable, Provide Brief Reason |
| N1 | Education for Property Owners, Tenants and Occupants | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| N2 | Activity Restrictions | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| N3 | Common Area Landscape Management | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| NON-STRUCTURAL SOURCE CONTROL BMPs | | | | |
|------------------------------------|---|-------------------------------------|-------------------------------------|--|
| ID | Name | Included? | Not Applicable? | If Not Applicable, Provide Brief Reason |
| N4 | BMP Maintenance | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| N5 | Title 22 CCR Compliance (How development will comply) | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Not applicable |
| N6 | Local Industrial Permit Compliance | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Not applicable |
| N7 | Spill Contingency Plan | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Not applicable |
| N8 | Underground Storage Tank Compliance | <input type="checkbox"/> | <input checked="" type="checkbox"/> | No underground storage tanks are proposed. |
| N9 | Hazardous Materials Disclosure Compliance | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Not applicable |
| N10 | Uniform Fire Code Implementation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Not applicable |
| N11 | Common Area Litter Control | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| N12 | Employee Training | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| N13 | Housekeeping of Loading Docks | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| N14 | Common Area Catch Basin Inspection | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| N15 | Street Sweeping Private Streets and Parking Lots | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| N16 | Retail Gasoline Outlets | <input type="checkbox"/> | <input checked="" type="checkbox"/> | No retail gasoline outlets are proposed. |

N1, Education for Property Owners, Tenants and Occupants

Educational materials and training will be provided to property owners, residents and tenants, including education materials and restrictions to reduce pollutants from reaching the storm drain system. Materials are listed in Section VII and available in Appendix C.

N2, Activity Restrictions

The owner shall develop activity restrictions (via CC&Rs or equivalent) that include language to restrict activities that have the potential to create adverse impacts on water quality. Activities include but are not limited to: the handling and disposal of contaminants, trash management and litter control, irrigation and landscaping practices, fertilizer applications and household waste management practices, prohibition of vehicle washing on-site, prohibiting washing or hosing of walkways and driveways, etc.

N3, Common Area Landscape Management

Management programs will be designed and implemented by the Owner/POA, which will maintain all the common areas within the project site (via landscape contractor). These programs will cover how

to reduce the potential pollutant sources of fertilizer and pesticide uses, utilization of water-efficient landscaping practices and proper disposal of landscape wastes in accordance with city requirements.

N4, BMP Maintenance

The Owner/POA will be responsible for the implementation and maintenance of each applicable non-structural BMP, as well as scheduling inspections and maintenance of all applicable structural BMP facilities through its landscape contractor and any other necessary maintenance contractors. Further details on maintenance for source control and treatment control BMPs are included in Section V.

N11, Common Area Litter Control

The Owner/POA will be responsible for performing trash pickup and sweeping of littered common areas on a weekly basis or whenever necessary. Responsibilities will also include noting improper disposal materials by homeowners and reporting such violations for investigation.

N12, Employee Training

All employees of the POA and any contractors will require training to ensure that employees are aware of maintenance activities that may result in pollutants reaching the storm drain.

N14, Common Area Catch Basin Inspection

All private catch basins will be maintained and cleaned by the POA. All public catch basins will be maintained by the City of Newport Beach. These activities will be done prior to the rainy season, no later than October 1st of each year.

N15, Street Sweeping Private Streets and Parking Lots

The POA shall be responsible for the street sweeping of all drive aisles and parking areas within the project quarterly, and prior to the rainy season, no later than October 1st of each year.

IV.3.9 Structural Source Control BMPs

The table below indicates all BMPs to be incorporated in the project. For those designated as not applicable (N/A), a brief explanation why is provided.

| STRUCTURAL SOURCE CONTROL BMPs | | | | |
|--------------------------------|--|-------------------------------------|-------------------------------------|---|
| ID | Name | Included? | Not Applicable? | If Not Applicable, Provide Brief Reason |
| S1 SD-13 | Provide storm drain system stenciling and signage | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| S2 SD-34 | Design and construct outdoor material storage areas to reduce pollution introduction | <input type="checkbox"/> | <input checked="" type="checkbox"/> | No outdoor material storage areas are proposed. |
| S3 SD-32 | Design and construct trash and waste storage areas to reduce pollution introduction | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

| STRUCTURAL SOURCE CONTROL BMPs | | | | |
|--------------------------------|--|-------------------------------------|-------------------------------------|--|
| ID | Name | Included? | Not Applicable? | If Not Applicable, Provide Brief Reason |
| S4 SD-12 | Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| S5 | Protect slopes and channels and provide energy dissipation | <input type="checkbox"/> | <input checked="" type="checkbox"/> | No significant slopes or channels within the proposed project. |
| S6 SD-31 | Properly Design: Dock areas | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| S7 SD-31 | Properly Design: Maintenance bays | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| S8 SD-33 | Properly Design: Vehicle wash areas | <input type="checkbox"/> | <input checked="" type="checkbox"/> | No vehicle wash areas are proposed. |
| S9 SD-36 | Properly Design: Outdoor processing areas | <input type="checkbox"/> | <input checked="" type="checkbox"/> | No outdoor processing areas are proposed. |
| S10 | Properly Design: Equipment wash areas | <input type="checkbox"/> | <input checked="" type="checkbox"/> | No equipment wash areas are proposed. |
| S11 SD-30 | Properly Design: Fueling areas | <input type="checkbox"/> | <input checked="" type="checkbox"/> | No fueling areas are proposed. |
| S12 SD-10 | Properly Design: Hillside landscaping | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Project site is not located in a hillside area. |
| S13 | Properly Design: Wash water control for food preparation areas | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| S14 | Properly Design: Community car wash racks | <input type="checkbox"/> | <input checked="" type="checkbox"/> | No community car wash racks are proposed. |

S1/SD-13, Provide storm drain system stenciling and signage

The developer will be responsible for the stenciling of all catch basins to include a legible message such as "No Dumping - Drains to Ocean" or an equally effective phrase. The Owner will be responsible for maintaining and replacement of signage when necessary.

S3/SD-32, Design and construct trash and waste storage areas to reduce pollution introduction

All trash and waste shall be stored in containers that have lids or tarps to minimize direct precipitation into the containers. The site operator shall ensure trash is stored properly and does not come into contact with runoff.

S4/SD-12, Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control

The owner/operator will be responsible for the installation and maintenance of all common landscape areas utilizing similar planting materials with similar water requirements to reduce excess irrigation runoff. The owner/operator will be responsible for implementing all efficient irrigation systems for common area landscaping including but not limited to provisions for water sensors and programmable irrigation cycles. The irrigation systems shall be in conformance with water use efficiency guidelines.

S13, Properly Design: Wash water control for food preparation areas

All wash water from food prep areas will be controlled and proper staff training conducted by the site operator. Food preparation facilities shall meet all health and safety, building and safety and any other applicable regulations, codes requirements.

IV.4 ALTERNATIVE COMPLIANCE PLAN

IV.4.1 Water Quality Credits

Local jurisdictions may develop a water quality credit program that applies to certain types of development projects after they first evaluate the feasibility of meeting LID requirements on-site. If it is not feasible to meet the requirements for on-site LID, project proponents for specific project types can apply credits that would reduce project obligations for selecting and sizing other treatment BMPs or participating in other alternative programs.

| WATER QUALITY CREDITS | |
|---|-------------------------------------|
| Credit | Applicable? |
| Redevelopment projects that reduce the overall impervious footprint of the project site. | <input checked="" type="checkbox"/> |
| Brownfield redevelopment, meaning redevelopment, expansion, or reuse of real property which may be complicated by the presence or potential presence of hazardous substances, pollutants or contaminants, and which have the potential to contribute to adverse ground or surface water quality if not redeveloped. | <input type="checkbox"/> |
| Higher density development projects which include two distinct categories (credits can only be taken for one category): those with more than seven units per acre of development (lower credit allowance); vertical density developments, for example, those with a Floor to Area Ratio (FAR) of 2 or those having more than 18 units per acre (greater credit allowance) | <input checked="" type="checkbox"/> |
| Mixed use development, such as a combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that can demonstrate environmental benefits that would not be realized through single use projects (e.g. reduced vehicle trip traffic with the potential to reduce sources of water or air pollution). | <input checked="" type="checkbox"/> |

| WATER QUALITY CREDITS | |
|--|-------------------------------------|
| Credit | Applicable? |
| Transit-oriented developments, such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within one half mile of a mass transit center (e.g. bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned | <input type="checkbox"/> |
| Redevelopment projects in an established historic district, historic preservation area, or similar significant city area including core City Center areas (to be defined through mapping). | <input type="checkbox"/> |
| Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses. | <input type="checkbox"/> |
| Developments in a city center area. | <input type="checkbox"/> |
| Developments in historic districts or historic preservation areas. | <input type="checkbox"/> |
| Live-work developments, a variety of developments designed to support residential and vocational needs together – similar to criteria to mixed use development; would not be able to take credit for both categories. | <input checked="" type="checkbox"/> |
| In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas. | <input checked="" type="checkbox"/> |

At this time, no water quality credits have been applied to the project. However, the proposed project meets many of the water quality credit objectives and has been identified for potential credits in the future. Should any credits be applied, they shall be documented in the Final WQMP and applied to the overall DCV for the project.

IV.4.2 Alternative Compliance Plan Information

Not applicable. LID BMPs will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this Section.

SECTION V INSPECTION/MAINTENANCE RESPONSIBILITY FOR BMPs

It has been determined that Back Bay Landing LLC and successor POA shall assume all BMP inspection and maintenance responsibilities for the Back Bay Landing project.

| | |
|----------------------|--|
| Contact Name: | Michael Gelfand |
| Title: | Owner |
| Company: | Bayside Village Marina, LLC |
| Address: | 300 E. Coast Highway, Newport Beach CA 92660 |
| Phone: | 858.756.6696 |
| Fax: | N/A |
| Email: | michaelg@campland.com |

Should the maintenance responsibility be transferred at any time during the operational life of Back Bay Landing, such as when an HOA or POA is formed for a project, a formal notice of transfer shall be submitted to the City of Newport Beach at the time responsibility of the property subject to this WQMP is transferred. The transfer of responsibility shall be incorporated into this WQMP as an amendment.

The POA shall verify BMP implementation and ongoing maintenance through inspection, self-certification, survey, or other equally effective measure. The certification shall verify that, at a minimum, the inspection and maintenance of all structural BMPs including inspection and performance of any required maintenance in the late summer / early fall, prior to the start of the rainy season. A form that may be used to record implementation, maintenance, and inspection of BMPs is included in Appendix D.

The City of Newport Beach may conduct verifications to assure that implementation and appropriate maintenance of structural and non-structural BMPs prescribed within this WQMP is taking place at the project site. The POA shall retain operations, inspections and maintenance records of these BMPs and they will be made available to the City or County upon request. All records must be maintained for at least five (5) years after the recorded inspection date for the lifetime of the project.

The long-term maintenance funding for the project will originate from the lease agreements and executed through the POA.

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | | |
|--|--|--|-------------------|-------------------|
| | BMP | Inspection/Maintenance Activities | Minimum Frequency | Responsible Party |
| BIOTREATMENT BMPs | | | | |
| BIO-1 | Bioretention with Underdrains | Inspections should occur semi-annually or after major storm events to check for the following and remove accordingly: standing water, sediment, and trash & debris. Inspections should also look for potential clogging and clean planters or, if necessary, replace the entire filter bed. Inspect for weeds, and prune and/or replace plants in accordance with routine landscape maintenance activities. Replace mulch and prune shrubs as necessary. | 2x per year | POA |
| BIO-7 | Proprietary Biotreatment: Filtterra® or equivalent | Annual maintenance consists of a minimum of two scheduled visits, one after the rainy season to clean up after the wet season, and one before the wet season to inspect and clean the unit. Each maintenance visit consists of the following: Inspection; removal of trash, debris, sediment; Filter media and plant health evaluation and replacement if necessary; replacement of mulch. | 2x per year | POA |
| NON-STRUCTURAL SOURCE CONTROL BMPs | | | | |

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | | |
|--|--|---|-------------------|-------------------|
| | BMP | Inspection/Maintenance Activities | Minimum Frequency | Responsible Party |
| N1 | Education for Property Owners, Tenants and Occupants | Educational materials will be provided to tenants annually. Materials to be distributed are found in Appendix C of this WQMP. Tenants will be provided these materials by the Property Management prior to occupancy and annually thereafter. | Annually | POA |
| N2 | Activity Restrictions | The Owner will prescribe activity restrictions to protect surface water quality, through lease terms or other equally effective measure, for the property. Restrictions include, but are not limited to, prohibiting vehicle maintenance or vehicle washing. | Ongoing | POA |
| N3 | Common Area Landscape Management | Maintenance shall be consistent with City requirements. Fertilizer and/or pesticide usage shall be consistent with County Management Guidelines for Use of Fertilizers (OC DAMP Section 5.5) as well as City requirements. Maintenance includes mowing, weeding, and debris removal on a weekly basis. Trimming, replanting, and replacement of mulch shall be performed on an as-needed basis to prevent exposure of erodible surfaces. Trimmings, clippings, and other landscape wastes shall be properly disposed of in accordance with local regulations. Materials temporarily stockpiled during maintenance activities shall be placed away from water courses and storm drains inlets. | Monthly | POA |

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | | |
|--|---|---|-------------------|-------------------|
| | BMP | Inspection/Maintenance Activities | Minimum Frequency | Responsible Party |
| N4 | BMP Maintenance | Maintenance of structural BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP. Records of inspections and BMP maintenance shall be kept by the Owner and shall be available for review upon request. | Ongoing | POA |
| N5 | Title 22 CCR Compliance (How development will comply) | Not Applicable | | |
| N6 | Local Industrial Permit Compliance | Not Applicable | | |
| N7 | Spill Contingency Plan | Not Applicable | | |
| N8 | Underground Storage Tank Compliance | Not Applicable | | |
| N9 | Hazardous Materials Disclosure Compliance | Not Applicable | | |
| N10 | Uniform Fire Code Implementation | Not Applicable | | |
| N11 | Common Area Litter Control | Litter patrol, violations investigations, reporting and other litter control activities shall be performed on a weekly basis and in conjunction with routine maintenance activities. | Weekly | POA |
| N12 | Employee Training | Educate all new employees/ managers on storm water pollution prevention, particularly good housekeeping practices, prior to the start of the rainy season (October 1). Refresher courses shall be conducted on an as needed basis. | Annually | POA |
| N13 | Housekeeping of Loading Docks | Maintain area clean of trash and debris at all times. Additional details to be provided in Final WQMP once a site plan is developed. | | |

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | | |
|--|--|---|-------------------|-------------------|
| | BMP | Inspection/Maintenance Activities | Minimum Frequency | Responsible Party |
| N14 | Common Area Catch Basin Inspection | Catch basin inlets and other drainage facilities shall be inspected after each storm event and once per year. Inlets and other facilities shall be cleaned prior to the rainy season, by October 1 st each year. | Annually | POA |
| N15 | Street Sweeping Private Streets and Parking Lots | Drive aisles & parking lots must be swept at least quarterly (every 3 months), including prior to the start of the rainy season (October 1 st). | Quarterly | POA |
| N16 | Retail Gasoline Outlets | Not Applicable | | |
| STRUCTURAL SOURCE CONTROL BMPs | | | | |
| S1 SD-13 | Provide storm drain system stenciling and signage | Storm drain stencils shall be inspected for legibility, at minimum, once prior to the storm season, no later than October 1 st each year. Those determined to be illegible will be re-stenciled as soon as possible. | Annually | POA |
| S2 SD-34 | Design and construct outdoor material storage areas to reduce pollution introduction | Not Applicable | | |
| S3 SD-32 | Design and construct trash and waste storage areas to reduce pollution introduction | Sweep trash area at least once per week and before October 1 st each year. Maintain area clean of trash and debris at all times. | Weekly | POA |

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | | |
|--|--|---|-------------------|-------------------|
| | BMP | Inspection/Maintenance Activities | Minimum Frequency | Responsible Party |
| S4 SD-12 | Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control | In conjunction with routine maintenance activities, verify that landscape design continues to function properly by adjusting properly to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, weather, and day or night time temperatures. | Monthly | POA |
| S5 | Protect slopes and channels and provide energy dissipation | Not Applicable | | |
| S6 SD-31 | Properly Design: Dock areas | Maintain area clean of trash and debris at all times. Additional details to be provided in Final WQMP once a site plan is developed. | | |
| S7 SD-31 | Properly Design: Maintenance bays | Not Applicable | | |
| S8 SD-33 | Properly Design: Vehicle wash areas | Not Applicable | | |
| S9 SD-36 | Properly Design: Outdoor processing areas | Not Applicable | | |
| S10 | Properly Design: Equipment wash areas | Not Applicable | | |
| S11 SD-30 | Properly Design: Fueling areas | Not Applicable | | |
| S12 SD-10 | Properly Design: Hillside landscaping | Not Applicable | | |

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | | |
|--|--|--|-------------------|-------------------|
| | BMP | Inspection/Maintenance Activities | Minimum Frequency | Responsible Party |
| S13 | Properly Design: Wash water control for food preparation areas | Food preparation areas will be inspected on a regular basis to ensure proper waste disposal and water usage procedures. Any grease interceptors shall be inspected and maintained in accordance with manufacturer's recommendations (typically quarterly). | Quarterly | |
| S14 | Properly Design: Community car wash racks | Not Applicable | | |

Any waste generated from maintenance activities will be disposed of properly. Wash water and other waste from maintenance activities is not to be discharged or disposed of into the storm drain system. Clippings from landscape maintenance (i.e. prunings) will be collected and disposed of properly off-site, and will not be washed into the streets, local area drains/conveyances, or catch basin inlets.

SECTION VI SITE PLAN AND DRAINAGE PLAN

The exhibits provided in this section are to illustrate the post construction BMPs prescribed within this WQMP. Drainage flow information of the proposed project, such as general surface flow lines, concrete or other surface drainage conveyances, and storm drain facilities are also depicted. All structural source control and treatment control BMPs are shown as well.

EXHIBITS

- Location Map
- Conceptual Site Plan
- Preliminary WQMP Exhibit

BMP DETAILS

- Bioretention With Underdrains (BIO-1)
- Proprietary Bioretention (BIO-7)
- Bioretention (TC-32)
- Filterra® Bioretention Units

EXHIBIT 1
LOCATION MAP

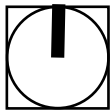
Back Bay Landing is located immediately north east of Pacific Coast Highway in Newport Beach, California. The site is bounded by Coast Highway and Newport Harbor on the south and west, Bayside Drive to the south, the Newport Back Bay channel to the west and Bayside Village Mobile Home Park to the southeast.



- Legend
- Project Area (Parcel 3)
 - Back Bay Landing Mixed-use Project Area
 - PC-9 Boundary

Source: Mapquest

LOCATION MAP



N.T.S.
5-30-2012

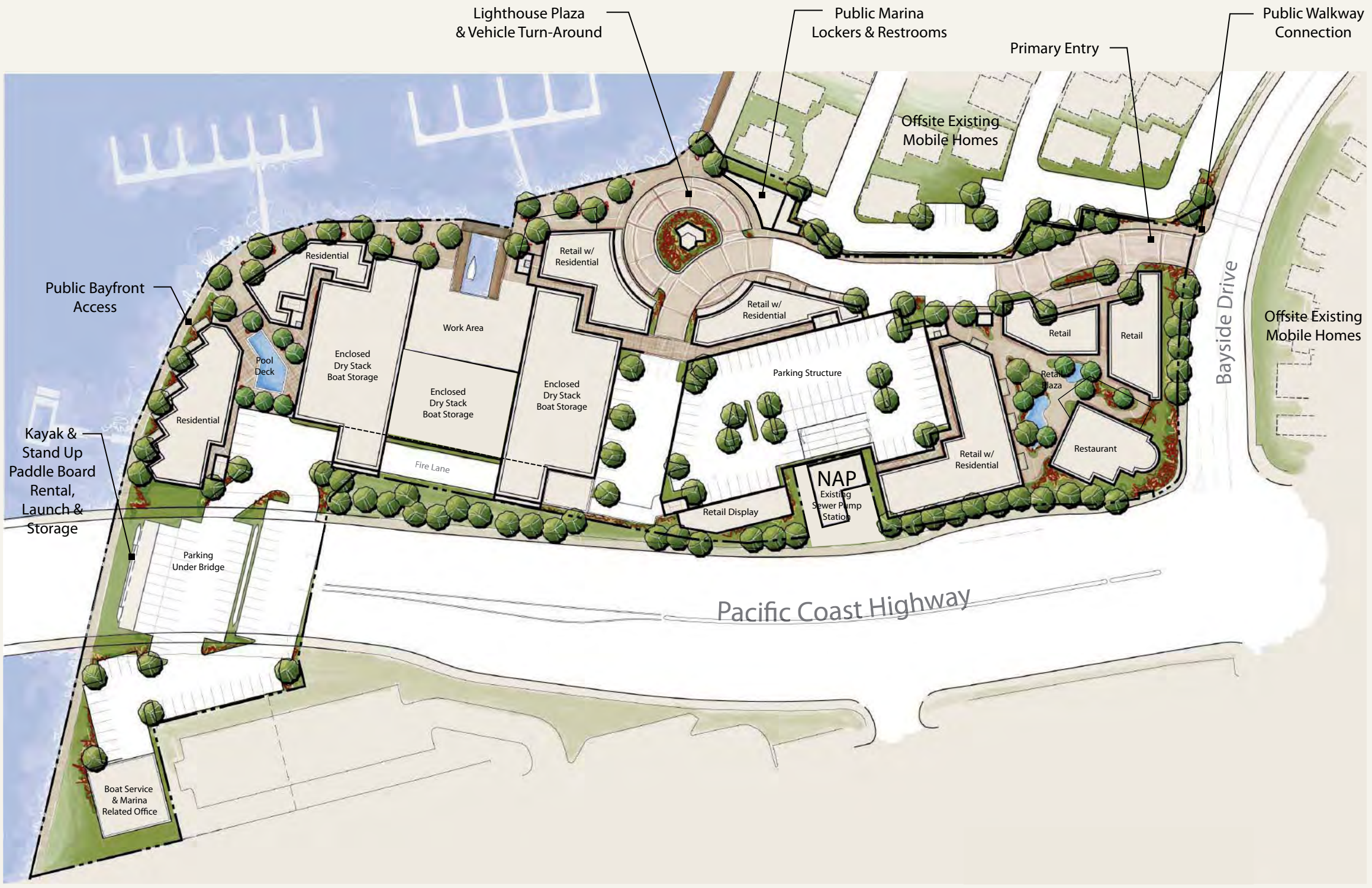
BACK BAY LANDING
NEWPORT BEACH, CALIFORNIA

EXHIBIT 8
CONCEPTUAL SITE &
LANDSCAPE PLAN

DESIGN GUIDELINES

Back Bay Landing is an integrated, mixed-use waterfront village with visitor serving retail and marine service commercial facilities, as well as a limited amount of attached residential uses.

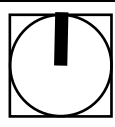
It is designed to evoke a seaside village and has a strong focus on the pedestrian experience.



Note: Site and landscape plan provided for conceptual purposes only and is subject to change.

Source: Stoutenborough Inc., Architects & Planners

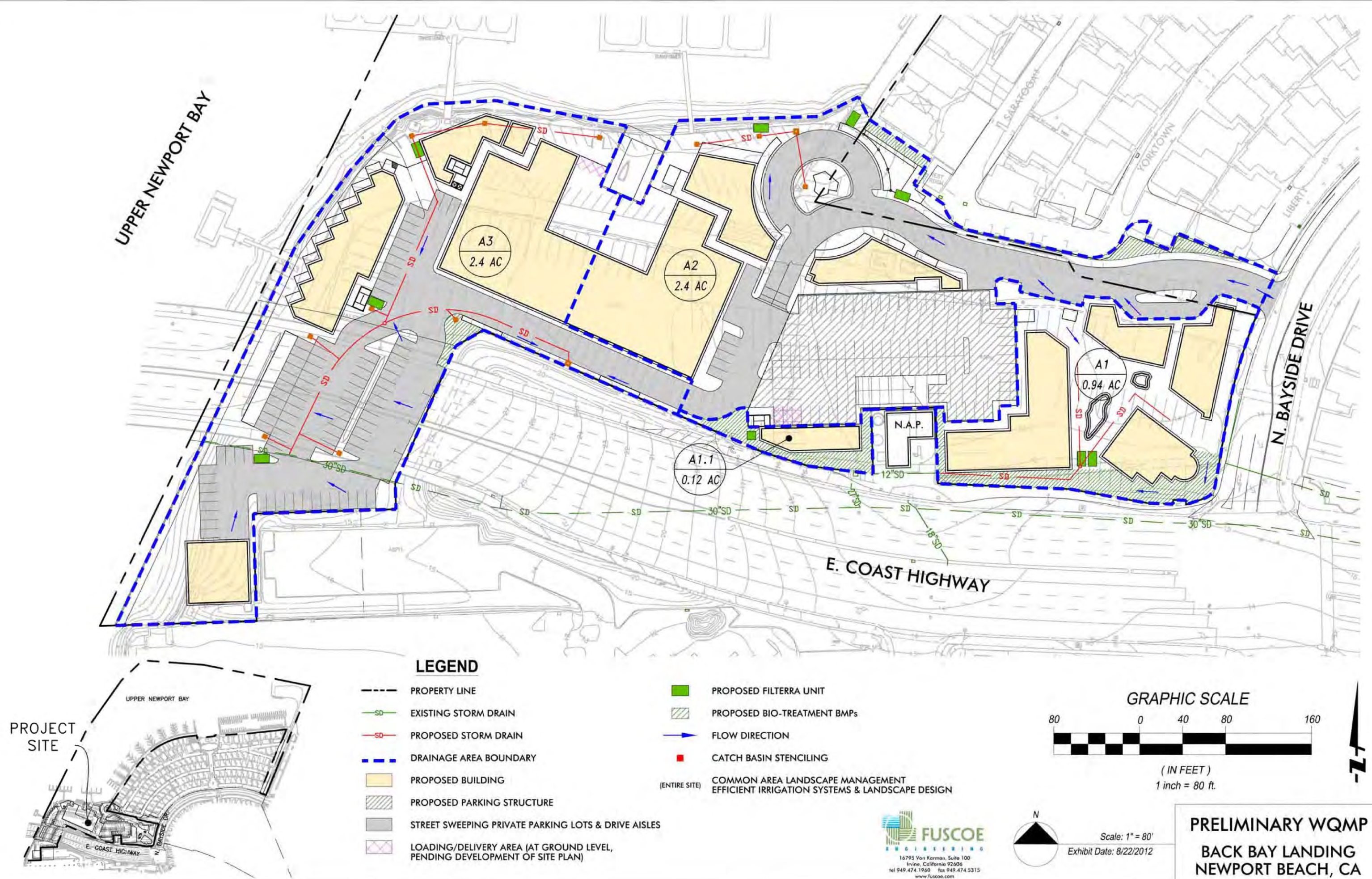
CONCEPTUAL SITE PLAN



5-30-2012

BACK BAY LANDING
NEWPORT BEACH, CALIFORNIA

P:\PROJECTS\1048\01\WATER\GRAPHICS\WQMP\104801XH_PRELIMWQMP.DWG (08-22-12 4:43:20PM) Plotted by: April McMillan



XIV.5. Biotreatment BMP Fact Sheets (BIO)

Conceptual criteria for biotreatment BMP selection, design, and maintenance are contained in [Appendix XII](#). These criteria are generally applicable to the design of biotreatment BMPs in Orange County and BMP-specific guidance is provided in the following fact sheets.

Note: Biotreatment BMPs shall be designed to provide the maximum feasible infiltration and ET based on criteria contained in [Appendix XI.2](#).

BIO-1: Bioretention with Underdrains

Bioretention stormwater treatment facilities are landscaped shallow depressions that capture and filter stormwater runoff. These facilities function as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. The facilities normally consist of a ponding area, mulch layer, planting soils, and plants. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded, and sequestered by the soil and plants. Bioretention with an underdrain are utilized for areas with low permeability native soils or steep slopes where the underdrain system that routes the treated runoff to the storm drain system rather than depending entirely on infiltration. [Bioretention must be designed without an underdrain](#) in areas of high soil permeability.

Also known as:

- Rain gardens with underdrains
- Vegetated media filter
- Downspout planter boxes



Bioretention

Source: Geosyntec Consultants

Feasibility Screening Considerations

- If there are no hazards associated with infiltration (such as groundwater concerns, contaminant plumes or geotechnical concerns), [bioinfiltration facilities](#), which achieve partial infiltration, should be used to maximize infiltration.
- Bioretention with underdrain facilities should be lined if contaminant plumes or geotechnical concerns exist. If high groundwater is the reason for infiltration infeasibility, bioretention facilities with underdrains do not need to be lined.

Opportunity Criteria

- Land use may include commercial, residential, mixed use, institutional, and subdivisions. Bioretention may also be applied in parking lot islands, cul-de-sacs, traffic circles, road shoulders, road medians, and next to buildings in planter boxes.
- Drainage area is ≤ 5 acres.
- Area is available for infiltration.

- Site must have adequate relief between land surface and the stormwater conveyance system to permit vertical percolation through the soil media and collection and conveyance in underdrain to stormwater conveyance system.

OC-Specific Design Criteria and Considerations

- ☐ Ponding depth should not exceed 18 inches; fencing may be required if ponding depth is greater than 6 inches to mitigate drowning.
- ☐ The minimum soil depth is 2 feet (3 feet is preferred).
- ☐ The maximum drawdown time of the bioretention ponding area is 48 hours. The maximum drawdown time of the planting media and gravel drainage layer is 96 hours, if applicable.

Infiltration pathways may need to be restricted due to the close proximity of roads, foundations, or other infrastructure. A geomembrane liner, or other equivalent water proofing, may be placed along the vertical walls to reduce lateral flows. This liner should have a minimum thickness of 30 mils.
- ☐ If infiltration in bioretention location is hazardous due to groundwater or geotechnical concerns, a geomembrane liner must be installed at the base of the bioretention facility. This liner should have a minimum thickness of 30 mils.
- ☐ The planting media placed in the cell shall be designed per the recommendations contained in MISC-1: Planting/Storage Media
- ☐ Plant materials should be tolerant of summer drought, ponding fluctuations, and saturated soil conditions for 48 hours; native place species and/or hardy cultivars that are not invasive and do not require chemical inputs should be used to the maximum extent feasible
- ☐ The bioretention area should be covered with 2-4 inches (average 3 inches) or mulch at the start and an additional placement of 1-2 inches of mulch should be added annually.
- ☐ Underdrain should be sized with a 6 inch minimum diameter and have a 0.5% minimum slope.
- ☐ Underdrain should be slotted polyvinyl chloride (PVC) pipe; underdrain pipe should be more than 5 feet from tree locations (if space allows).
- ☐ A gravel blanket or bedding is required for the underdrain pipe(s). At least 0.5 feet of washed aggregate must be placed below, to the top, and to the sides of the underdrain pipe(s).
- ☐ An overflow device is required at the top of the bioretention area ponding depth.
- ☐ Dispersed flow or energy dissipation (i.e. splash rocks) for piped inlets should be provided at basin inlet to prevent erosion.
- ☐ Ponding area side slopes shall be no steeper than 3:1 (H:V) unless designed as a planter box BMP with appropriate consideration for trip and fall hazards.

Simple Sizing Method for Bioretention with Underdrain

If the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1** is used to size a bioretention with underdrain facility, the user selects the basin depth and then determines the appropriate surface area to capture the DCV. The sizing steps are as follows:

Step 1: Determine DCV

Calculate the DCV using the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1**.

Step 2: Verify that the Ponding Depth will Draw Down within 48 Hours

The ponding area drawdown time can be calculated using the following equation:

$$DD_P = (d_P / K_{MEDIA}) \times 12 \text{ in/ft}$$

Where:

DD_P = time to drain ponded water, hours

d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

K_{MEDIA} = media design infiltration rate, in/hr (equivalent to the media hydraulic conductivity with a factor of safety of 2; K_{MEDIA} of 2.5 in/hr should be used unless other information is available)

If the drawdown time exceeds 48 hours, adjust ponding depth and/or media infiltration rate until 48 hour drawdown time is achieved.

Step 3: Determine the Depth of Water Filtered During Design Capture Storm

The depth of water filtered during the design capture storm can be estimated as the amount routed through the media during the storm, or the ponding depth, whichever is smaller.

$$d_{FILTERED} = \text{Minimum} [((K_{MEDIA} \times T_{ROUTING})/12), d_P]$$

Where:

$d_{FILTERED}$ = depth of water that may be considered to be filtered during the design storm event, ft

K_{MEDIA} = media design infiltration rate, in/hr (equivalent to the media hydraulic conductivity with a factor of safety of 2; K_{MEDIA} of 2.5 in/hr should be used unless other information is available)

$T_{ROUTING}$ = storm duration that may be assumed for routing calculations; this should be assumed to be no greater than 3 hours. If the designer desires to account for further routing effects, the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See [Appendix III.3.2](#)) should be used.

d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

Step 4: Determine the Facility Surface Area

$$A = DCV / (d_P + d_{FILTERED})$$

Where:

A = required area of bioretention facility, sq-ft

DCV = design capture volume, cu-ft

$d_{FILTERED}$ = depth of water that may be considered to be filtered during the design storm event, ft

d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

Capture Efficiency Method for Bioretention with Underdrains

If the bioretention geometry has already been defined and the user wishes to account more explicitly for routing, the user can determine the required footprint area using the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See [Appendix III.3.2](#)) to determine the fraction of the DCV that must be provided to manage 80 percent of average annual runoff volume. This method accounts for drawdown time different than 48 hours.

Step 1: Determine the drawdown time associated with the selected basin geometry

$$DD = (d_P / K_{DESIGN}) \times 12 \text{ in/ft}$$

Where:

DD = time to completely drain infiltration basin ponding depth, hours

d_p = bioretention ponding depth, ft (should be less than or equal to 1.5 ft)

K_{DESIGN} = design media infiltration rate, in/hr (assume 2.5 inches per hour unless otherwise proposed)

If drawdown is less than 3 hours, the drawdown time should be rounded to 3 hours or the Capture Efficiency Method for Flow-based BMPs (See [Appendix III.3.3](#)) shall be used.

Step 2: Determine the Required Adjusted DCV for this Drawdown Time

Use the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See [Appendix III.3.2](#)) to calculate the fraction of the DCV the basin must hold to achieve 80 percent capture of average annual stormwater runoff volume based on the basin drawdown time calculated above.

Step 3: Determine the Basin Infiltrating Area Needed

The required infiltrating area (i.e. the surface area of the top of the media layer) can be calculated using the following equation:

$$A = \text{Design Volume} / d_p$$

Where:

A = required infiltrating area, sq-ft (measured at the media surface)

Design Volume = fraction of DCV, adjusted for drawdown, cu-ft (see Step 2)

d_p = ponding depth of water stored in bioretention area, ft (from Step 1)

This does not include the side slopes, access roads, etc. which would increase bioretention footprint. If the area required is greater than the selected basin area, adjust surface area or adjust ponding depth and recalculate required area until the required area is achieved.

Configuration for Use in a Treatment Train

- Bioretention areas may be preceded in a treatment train by HSCs in the drainage area, which would reduce the required design volume of the bioretention cell. For example, bioretention could be used to manage overflow from a cistern.
- Bioretention areas can be used to provide pretreatment for underground infiltration systems.

Additional References for Design Guidance

- CASQA BMP Handbook for New and Redevelopment:
<http://www.cabmphandbooks.com/Documents/Development/TC-32.pdf>
- SMC LID Manual (pp 68):
http://www.lowimpactdevelopment.org/guest75/pub/All_Projects/SoCal_LID_Manual/SoCalLID_Manual_FINAL_040910.pdf
- Los Angeles County Stormwater BMP Design and Maintenance Manual, Chapter 5:
http://dpw.lacounty.gov/DES/design_manuals/StormwaterBMPDesignandMaintenance.pdf
- San Diego County LID Handbook Appendix 4 (Factsheet 7):
<http://www.sdcountry.ca.gov/dplu/docs/LID-Appendices.pdf>
- Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 4:
http://www.laschools.org/employee/design/fs-studies-and-reports/download/white_paper_report_material/Storm_Water_Technical_Manual_2009-opt-red.pdf?version_id=76975850
- County of Los Angeles Low Impact Development Standards Manual, Chapter 5:
http://dpw.lacounty.gov/wmd/LA_County_LID_Manual.pdf



Design Considerations

- Soil for Infiltration
- Tributary Area
- Slope
- Aesthetics
- Environmental Side-effects

Description

The bioretention best management practice (BMP) functions as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. These facilities normally consist of a grass buffer strip, sand bed, ponding area, organic layer or mulch layer, planting soil, and plants. The runoff's velocity is reduced by passing over or through buffer strip and subsequently distributed evenly along a ponding area. Exfiltration of the stored water in the bioretention area planting soil into the underlying soils occurs over a period of days.

California Experience

None documented. Bioretention has been used as a stormwater BMP since 1992. In addition to Prince George's County, MD and Alexandria, VA, bioretention has been used successfully at urban and suburban areas in Montgomery County, MD; Baltimore County, MD; Chesterfield County, VA; Prince William County, VA; Smith Mountain Lake State Park, VA; and Cary, NC.

Advantages

- Bioretention provides stormwater treatment that enhances the quality of downstream water bodies by temporarily storing runoff in the BMP and releasing it over a period of four days to the receiving water (EPA, 1999).
- The vegetation provides shade and wind breaks, absorbs noise, and improves an area's landscape.

Limitations

- The bioretention BMP is not recommended for areas with slopes greater than 20% or where mature tree removal would

Targeted Constituents

| | | |
|-------------------------------------|----------------|---|
| <input checked="" type="checkbox"/> | Sediment | ■ |
| <input checked="" type="checkbox"/> | Nutrients | ▲ |
| <input checked="" type="checkbox"/> | Trash | ■ |
| <input checked="" type="checkbox"/> | Metals | ■ |
| <input checked="" type="checkbox"/> | Bacteria | ■ |
| <input checked="" type="checkbox"/> | Oil and Grease | ■ |
| <input checked="" type="checkbox"/> | Organics | ■ |

Legend (Removal Effectiveness)

- Low
- High
- ▲ Medium



be required since clogging may result, particularly if the BMP receives runoff with high sediment loads (EPA, 1999).

- Bioretention is not a suitable BMP at locations where the water table is within 6 feet of the ground surface and where the surrounding soil stratum is unstable.
- By design, bioretention BMPs have the potential to create very attractive habitats for mosquitoes and other vectors because of highly organic, often heavily vegetated areas mixed with shallow water.
- In cold climates the soil may freeze, preventing runoff from infiltrating into the planting soil.

Design and Sizing Guidelines

- The bioretention area should be sized to capture the design storm runoff.
- In areas where the native soil permeability is less than 0.5 in/hr an underdrain should be provided.
- Recommended minimum dimensions are 15 feet by 40 feet, although the preferred width is 25 feet. Excavated depth should be 4 feet.
- Area should drain completely within 72 hours.
- Approximately 1 tree or shrub per 50 ft² of bioretention area should be included.
- Cover area with about 3 inches of mulch.

Construction/Inspection Considerations

Bioretention area should not be established until contributing watershed is stabilized.

Performance

Bioretention removes stormwater pollutants through physical and biological processes, including adsorption, filtration, plant uptake, microbial activity, decomposition, sedimentation and volatilization (EPA, 1999). Adsorption is the process whereby particulate pollutants attach to soil (e.g., clay) or vegetation surfaces. Adequate contact time between the surface and pollutant must be provided for in the design of the system for this removal process to occur. Thus, the infiltration rate of the soils must not exceed those specified in the design criteria or pollutant removal may decrease. Pollutants removed by adsorption include metals, phosphorus, and hydrocarbons. Filtration occurs as runoff passes through the bioretention area media, such as the sand bed, ground cover, and planting soil.

Common particulates removed from stormwater include particulate organic matter, phosphorus, and suspended solids. Biological processes that occur in wetlands result in pollutant uptake by plants and microorganisms in the soil. Plant growth is sustained by the uptake of nutrients from the soils, with woody plants locking up these nutrients through the seasons. Microbial activity within the soil also contributes to the removal of nitrogen and organic matter. Nitrogen is removed by nitrifying and denitrifying bacteria, while aerobic bacteria are responsible for the decomposition of the organic matter. Microbial processes require oxygen and can result in depleted oxygen levels if the bioretention area is not adequately

aerated. Sedimentation occurs in the swale or ponding area as the velocity slows and solids fall out of suspension.

The removal effectiveness of bioretention has been studied during field and laboratory studies conducted by the University of Maryland (Davis et al, 1998). During these experiments, synthetic stormwater runoff was pumped through several laboratory and field bioretention areas to simulate typical storm events in Prince George's County, MD. Removal rates for heavy metals and nutrients are shown in Table 1.

| Table 1 Laboratory and Estimated Bioretention Davis et al. (1998); PGDER (1993) | |
|--|---------------------|
| Pollutant | Removal Rate |
| Total Phosphorus | 70-83% |
| Metals (Cu, Zn, Pb) | 93-98% |
| TKN | 68-80% |
| Total Suspended Solids | 90% |
| Organics | 90% |
| Bacteria | 90% |

Results for both the laboratory and field experiments were similar for each of the pollutants analyzed. Doubling or halving the influent pollutant levels had little effect on the effluent pollutants concentrations (Davis et al, 1998).

The microbial activity and plant uptake occurring in the bioretention area will likely result in higher removal rates than those determined for infiltration BMPs.

Siting Criteria

Bioretention BMPs are generally used to treat stormwater from impervious surfaces at commercial, residential, and industrial areas (EPA, 1999). Implementation of bioretention for stormwater management is ideal for median strips, parking lot islands, and swales. Moreover, the runoff in these areas can be designed to either divert directly into the bioretention area or convey into the bioretention area by a curb and gutter collection system.

The best location for bioretention areas is upland from inlets that receive sheet flow from graded areas and at areas that will be excavated (EPA, 1999). In order to maximize treatment effectiveness, the site must be graded in such a way that minimizes erosive conditions as sheet flow is conveyed to the treatment area. Locations where a bioretention area can be readily incorporated into the site plan without further environmental damage are preferred. Furthermore, to effectively minimize sediment loading in the treatment area, bioretention only should be used in stabilized drainage areas.

Additional Design Guidelines

The layout of the bioretention area is determined after site constraints such as location of utilities, underlying soils, existing vegetation, and drainage are considered (EPA, 1999). Sites with loamy sand soils are especially appropriate for bioretention because the excavated soil can be backfilled and used as the planting soil, thus eliminating the cost of importing planting soil.

The use of bioretention may not be feasible given an unstable surrounding soil stratum, soils with clay content greater than 25 percent, a site with slopes greater than 20 percent, and/or a site with mature trees that would be removed during construction of the BMP.

Bioretention can be designed to be off-line or on-line of the existing drainage system (EPA, 1999). The drainage area for a bioretention area should be between 0.1 and 0.4 hectares (0.25 and 1.0 acres). Larger drainage areas may require multiple bioretention areas. Furthermore, the maximum drainage area for a bioretention area is determined by the expected rainfall intensity and runoff rate. Stabilized areas may erode when velocities are greater than 5 feet per second (1.5 meter per second). The designer should determine the potential for erosive conditions at the site.

The size of the bioretention area, which is a function of the drainage area and the runoff generated from the area is sized to capture the water quality volume.

The recommended minimum dimensions of the bioretention area are 15 feet (4.6 meters) wide by 40 feet (12.2 meters) long, where the minimum width allows enough space for a dense, randomly-distributed area of trees and shrubs to become established. Thus replicating a natural forest and creating a microclimate, thereby enabling the bioretention area to tolerate the effects of heat stress, acid rain, runoff pollutants, and insect and disease infestations which landscaped areas in urban settings typically are unable to tolerate. The preferred width is 25 feet (7.6 meters), with a length of twice the width. Essentially, any facilities wider than 20 feet (6.1 meters) should be twice as long as they are wide, which promotes the distribution of flow and decreases the chances of concentrated flow.

In order to provide adequate storage and prevent water from standing for excessive periods of time the ponding depth of the bioretention area should not exceed 6 inches (15 centimeters). Water should not be left to stand for more than 72 hours. A restriction on the type of plants that can be used may be necessary due to some plants' water intolerance. Furthermore, if water is left standing for longer than 72 hours mosquitoes and other insects may start to breed.

The appropriate planting soil should be backfilled into the excavated bioretention area. Planting soils should be sandy loam, loamy sand, or loam texture with a clay content ranging from 10 to 25 percent.

Generally the soil should have infiltration rates greater than 0.5 inches (1.25 centimeters) per hour, which is typical of sandy loams, loamy sands, or loams. The pH of the soil should range between 5.5 and 6.5, where pollutants such as organic nitrogen and phosphorus can be adsorbed by the soil and microbial activity can flourish. Additional requirements for the planting soil include a 1.5 to 3 percent organic content and a maximum 500 ppm concentration of soluble salts.

Soil tests should be performed for every 500 cubic yards (382 cubic meters) of planting soil, with the exception of pH and organic content tests, which are required only once per bioretention area (EPA, 1999). Planting soil should be 4 inches (10.1 centimeters) deeper than the bottom of the largest root ball and 4 feet (1.2 meters) altogether. This depth will provide adequate soil for the plants' root systems to become established, prevent plant damage due to severe wind, and provide adequate moisture capacity. Most sites will require excavation in order to obtain the recommended depth.

Planting soil depths of greater than 4 feet (1.2 meters) may require additional construction practices such as shoring measures (EPA, 1999). Planting soil should be placed in 18 inches or greater lifts and lightly compacted until the desired depth is reached. Since high canopy trees may be destroyed during maintenance the bioretention area should be vegetated to resemble a terrestrial forest community ecosystem that is dominated by understory trees. Three species each of both trees and shrubs are recommended to be planted at a rate of 2500 trees and shrubs per hectare (1000 per acre). For instance, a 15 foot (4.6 meter) by 40 foot (12.2 meter) bioretention area (600 square feet or 55.75 square meters) would require 14 trees and shrubs. The shrub-to-tree ratio should be 2:1 to 3:1.

Trees and shrubs should be planted when conditions are favorable. Vegetation should be watered at the end of each day for fourteen days following its planting. Plant species tolerant of pollutant loads and varying wet and dry conditions should be used in the bioretention area.

The designer should assess aesthetics, site layout, and maintenance requirements when selecting plant species. Adjacent non-native invasive species should be identified and the designer should take measures, such as providing a soil breach to eliminate the threat of these species invading the bioretention area. Regional landscaping manuals should be consulted to ensure that the planting of the bioretention area meets the landscaping requirements established by the local authorities. The designers should evaluate the best placement of vegetation within the bioretention area. Plants should be placed at irregular intervals to replicate a natural forest. Trees should be placed on the perimeter of the area to provide shade and shelter from the wind. Trees and shrubs can be sheltered from damaging flows if they are placed away from the path of the incoming runoff. In cold climates, species that are more tolerant to cold winds, such as evergreens, should be placed in windier areas of the site.

Following placement of the trees and shrubs, the ground cover and/or mulch should be established. Ground cover such as grasses or legumes can be planted at the beginning of the growing season. Mulch should be placed immediately after trees and shrubs are planted. Two to 3 inches (5 to 7.6 cm) of commercially-available fine shredded hardwood mulch or shredded hardwood chips should be applied to the bioretention area to protect from erosion.

Maintenance

The primary maintenance requirement for bioretention areas is that of inspection and repair or replacement of the treatment area's components. Generally, this involves nothing more than the routine periodic maintenance that is required of any landscaped area. Plants that are appropriate for the site, climatic, and watering conditions should be selected for use in the bioretention cell. Appropriately selected plants will aide in reducing fertilizer, pesticide, water, and overall maintenance requirements. Bioretention system components should blend over time through plant and root growth, organic decomposition, and the development of a natural

soil horizon. These biologic and physical processes over time will lengthen the facility's life span and reduce the need for extensive maintenance.

Routine maintenance should include a biannual health evaluation of the trees and shrubs and subsequent removal of any dead or diseased vegetation (EPA, 1999). Diseased vegetation should be treated as needed using preventative and low-toxic measures to the extent possible. BMPs have the potential to create very attractive habitats for mosquitoes and other vectors because of highly organic, often heavily vegetated areas mixed with shallow water. Routine inspections for areas of standing water within the BMP and corrective measures to restore proper infiltration rates are necessary to prevent creating mosquito and other vector habitat. In addition, bioretention BMPs are susceptible to invasion by aggressive plant species such as cattails, which increase the chances of water standing and subsequent vector production if not routinely maintained.

In order to maintain the treatment area's appearance it may be necessary to prune and weed. Furthermore, mulch replacement is suggested when erosion is evident or when the site begins to look unattractive. Specifically, the entire area may require mulch replacement every two to three years, although spot mulching may be sufficient when there are random void areas. Mulch replacement should be done prior to the start of the wet season.

New Jersey's Department of Environmental Protection states in their bioretention systems standards that accumulated sediment and debris removal (especially at the inflow point) will normally be the primary maintenance function. Other potential tasks include replacement of dead vegetation, soil pH regulation, erosion repair at inflow points, mulch replenishment, unclogging the underdrain, and repairing overflow structures. There is also the possibility that the cation exchange capacity of the soils in the cell will be significantly reduced over time. Depending on pollutant loads, soils may need to be replaced within 5-10 years of construction (LID, 2000).

Cost

Construction Cost

Construction cost estimates for a bioretention area are slightly greater than those for the required landscaping for a new development (EPA, 1999). A general rule of thumb (Coffman, 1999) is that residential bioretention areas average about \$3 to \$4 per square foot, depending on soil conditions and the density and types of plants used. Commercial, industrial and institutional site costs can range between \$10 to \$40 per square foot, based on the need for control structures, curbing, storm drains and underdrains.

Retrofitting a site typically costs more, averaging \$6,500 per bioretention area. The higher costs are attributed to the demolition of existing concrete, asphalt, and existing structures and the replacement of fill material with planting soil. The costs of retrofitting a commercial site in Maryland, Kettering Development, with 15 bioretention areas were estimated at \$111,600.

In any bioretention area design, the cost of plants varies substantially and can account for a significant portion of the expenditures. While these cost estimates are slightly greater than those of typical landscaping treatment (due to the increased number of plantings, additional soil excavation, backfill material, use of underdrains etc.), those landscaping expenses that would be required regardless of the bioretention installation should be subtracted when determining the net cost.

Perhaps of most importance, however, the cost savings compared to the use of traditional structural stormwater conveyance systems makes bioretention areas quite attractive financially. For example, the use of bioretention can decrease the cost required for constructing stormwater conveyance systems at a site. A medical office building in Maryland was able to reduce the amount of storm drain pipe that was needed from 800 to 230 feet - a cost savings of \$24,000 (PGDER, 1993). And a new residential development spent a total of approximately \$100,000 using bioretention cells on each lot instead of nearly \$400,000 for the traditional stormwater ponds that were originally planned (Rappahanock,). Also, in residential areas, stormwater management controls become a part of each property owner's landscape, reducing the public burden to maintain large centralized facilities.

Maintenance Cost

The operation and maintenance costs for a bioretention facility will be comparable to those of typical landscaping required for a site. Costs beyond the normal landscaping fees will include the cost for testing the soils and may include costs for a sand bed and planting soil.

References and Sources of Additional Information

Coffman, L.S., R. Goo and R. Frederick, 1999: Low impact development: an innovative alternative approach to stormwater management. Proceedings of the 26th Annual Water Resources Planning and Management Conference ASCE, June 6-9, Tempe, Arizona.

Davis, A.P., Shokouhian, M., Sharma, H. and Minami, C., "Laboratory Study of Biological Retention (Bioretention) for Urban Stormwater Management," *Water Environ. Res.*, 73(1), 5-14 (2001).

Davis, A.P., Shokouhian, M., Sharma, H., Minami, C., and Winogradoff, D. "Water Quality Improvement through Bioretention: Lead, Copper, and Zinc," *Water Environ. Res.*, accepted for publication, August 2002.

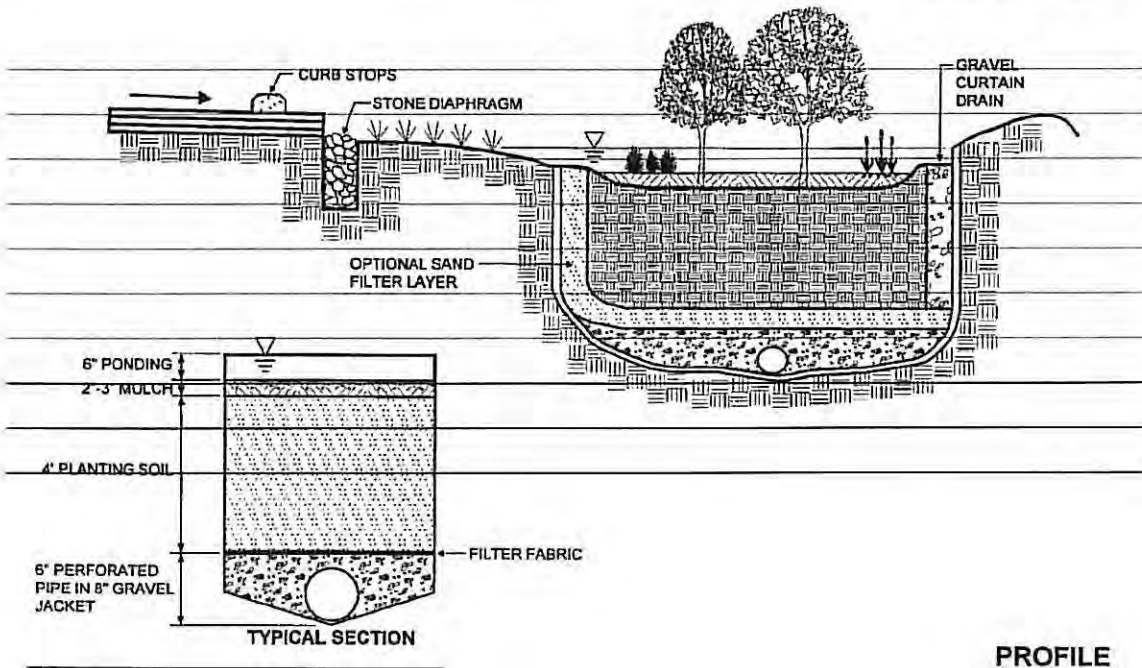
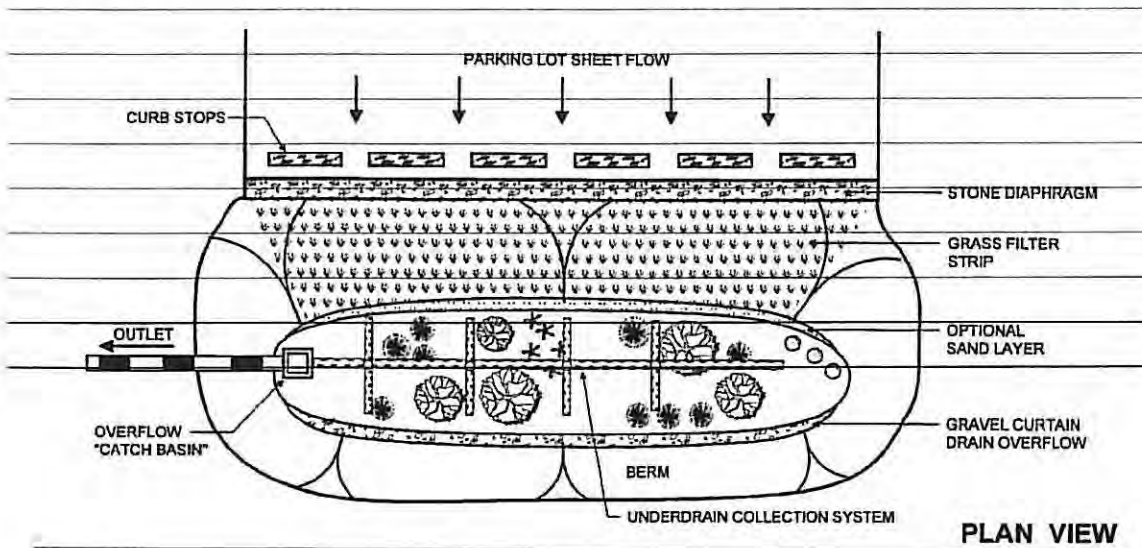
Kim, H., Seagren, E.A., and Davis, A.P., "Engineered Bioretention for Removal of Nitrate from Stormwater Runoff," *WEFTEC 2000 Conference Proceedings on CDROM Research Symposium, Nitrogen Removal*, Session 19, Anaheim CA, October 2000.

Hsieh, C.-h. and Davis, A.P. "Engineering Bioretention for Treatment of Urban Stormwater Runoff," *Watersheds 2002, Proceedings on CDROM Research Symposium*, Session 15, Ft. Lauderdale, FL, Feb. 2002.

Prince George's County Department of Environmental Resources (PGDER), 1993. Design Manual for Use of *Bioretention in Stormwater Management*. Division of Environmental Management, Watershed Protection Branch. Landover, MD.

U.S. EPA Office of Water, 1999. Stormwater Technology Fact Sheet: Bioretention. EPA 832-F-99-012.

Weinstein, N. Davis, A.P. and Veeramachaneni, R. "Low Impact Development (LID) Stormwater Management Approach for the Control of Diffuse Pollution from Urban Roadways," *5th International Conference Diffuse/Nonpoint Pollution and Watershed Management Proceedings*, C.S. Melching and Emre Alp, Eds. 2001 International Water Association



Schematic of a Bioretention Facility (MDE, 2000)

BIO-7: Proprietary Biotreatment

Proprietary biotreatment devices are devices that are manufactured to mimic natural systems such as bioretention areas by incorporating plants, soil, and microbes engineered to provide treatment at higher flow rates or volumes and with smaller footprints than their natural counterparts. Incoming flows are typically filtered through a planting media (mulch, compost, soil, plants, microbes, etc.) and either infiltrated or collected by an underdrain and delivered to the storm water conveyance system. Tree box filters are an increasingly common type of proprietary biotreatment device that are installed at curb level and filled with a bioretention type soil. For low to moderate flows they operate similarly to bioretention systems and are bypassed during high flows. Tree box filters are highly adaptable solutions that can be used in all types of development and in all types of soils but are especially applicable to dense urban parking lots, street, and roadways.

Also known as:

- Catch basin planter box
- Bioretention vault
- Tree box filter



Proprietary biotreatment

Source:

<http://www.americastusa.com/index.php/filtrerra/>

Feasibility Screening Considerations

- Proprietary biotreatment devices that are unlined may cause incidental infiltration. Therefore, an evaluation of site conditions should be conducted to evaluate whether the BMP should include an impermeable liner to avoid infiltration into the subsurface.

Opportunity Criteria

- Drainage areas of 0.25 to 1.0 acres.
- Land use may include commercial, residential, mixed use, institutional, and subdivisions. Proprietary biotreatment facilities may also be applied in parking lot islands, traffic circles, road shoulders, and road medians.
- Must not adversely affect the level of flood protection provided by the drainage system.

OC-Specific Design Criteria and Considerations

- ☐ Frequent maintenance and the use of screens and grates to keep trash out may decrease the likelihood of clogging and prevent obstruction and bypass of incoming flows.
- ☐ Consult proprietors for specific criteria concerning the design and performance.
- ☐ Proprietary biotreatment may include specific media to address pollutants of concern. However, for proprietary device to be considered a biotreatment device the media must be capable of supporting rigorous growth of vegetation.
- ☐ Proprietary systems must be acceptable to the reviewing agency. Reviewing agencies shall have the discretion to request performance information. Reviewing agencies shall have the discretion to deny the use of a proprietary BMP on the grounds of performance, maintenance considerations, or other relevant factors.

- ☐ In right of way areas, plant selection should not impair traffic lines of site. Local jurisdictions may also limit plant selection in keeping with landscaping themes.

Computing Sizing Criteria for Proprietary Biotreatment Device

- Proprietary biotreatment devices can be volume based or flow-based BMPs.
- Volume-based proprietary devices should be sized using the Simple Design Capture Volume Sizing Method described in [Appendix III.3.1](#) or the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs described in [Appendix III.3.2](#).
- The required design flowrate for flow-based proprietary devices should be computed using the Capture Efficiency Method for Flow-based BMPs described in [Appendix III.3.3](#).

Additional References for Design Guidance

- Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 4:
http://www.laschools.org/employee/design/fs-studies-and-reports/download/white_paper_report_material/Storm_Water_Technical_Manual_2009-opt-red.pdf?version_id=76975850
- Los Angeles County Stormwater BMP Design and Maintenance Manual, Chapter 9:
http://dpw.lacounty.gov/DES/design_manuals/StormwaterBMPDesignandMaintenance.pdf
- Santa Barbara BMP Guidance Manual, Chapter 6:
http://www.santabarbaraca.gov/NR/rdonlyres/91D1FA75-C185-491E-A882-49EE17789DF8/0/Manual_071008_Final.pdf

Low Impact Development Solutions for Stormwater Runoff

Filterra Bioretention Systems is the leading provider of stormwater biofiltration systems for the treatment of stormwater runoff generated from parking lots, roadways, commercial and residential developments. The Filterra System can be built in a variety of sizes, models and configurations. Filterra's compact size makes it ideal for both urban retrofits and space-constrained new developments. Filterra is easy to install, simple to maintain, and is approved by over 500 local, regional and state agencies.

Standard Filterra® System



The standard Filterra System is similar in concept to "raingardens" in its function and application but has been optimized for high volume/flow treatment and high pollutant removal.

Filterra® Curb Inlet with Internal Bypass System



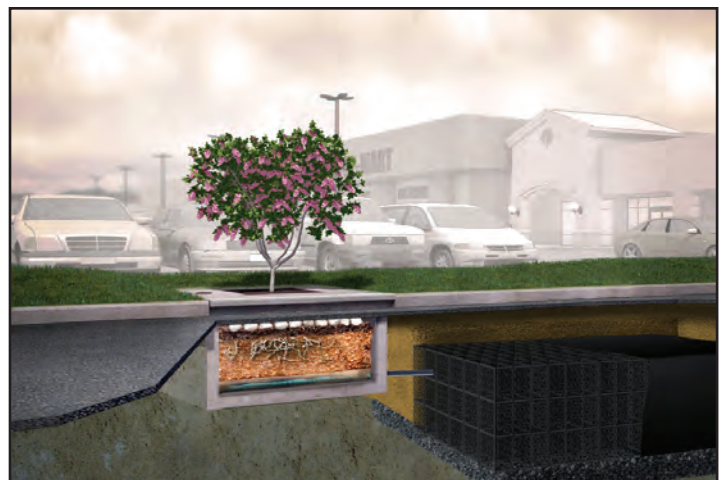
The Filterra Curb Inlet with Internal Bypass system incorporates biofiltration and an internal high flow bypass chamber into one single structure. This system eliminates the need and cost of installing a separate bypass structure and enables placement on grade or at low points.

Filterra® Roofdrain System



The Filterra Roofdrain System treats "Piped-In" stormwater runoff from rooftops and area drains. Using biofiltration, the system captures and immobilizes pollutants of concern such as: TSS, nutrients, oils, greases, metals and bacteria.

Filterra® combined with Underground Storage



Filterra combined with underground storage provides complete stormwater capture, treatment and storage in one packaged system. Surface flows can be conveyed into the Filterra and discharged to any underground storage system for detention, retention and re-use applications including landscape irrigation systems.



Standard Filterra System
Richmond, VA



Standard Filterra System
Independence, WA



Filtrerra Roofdrain System
Salem, VA



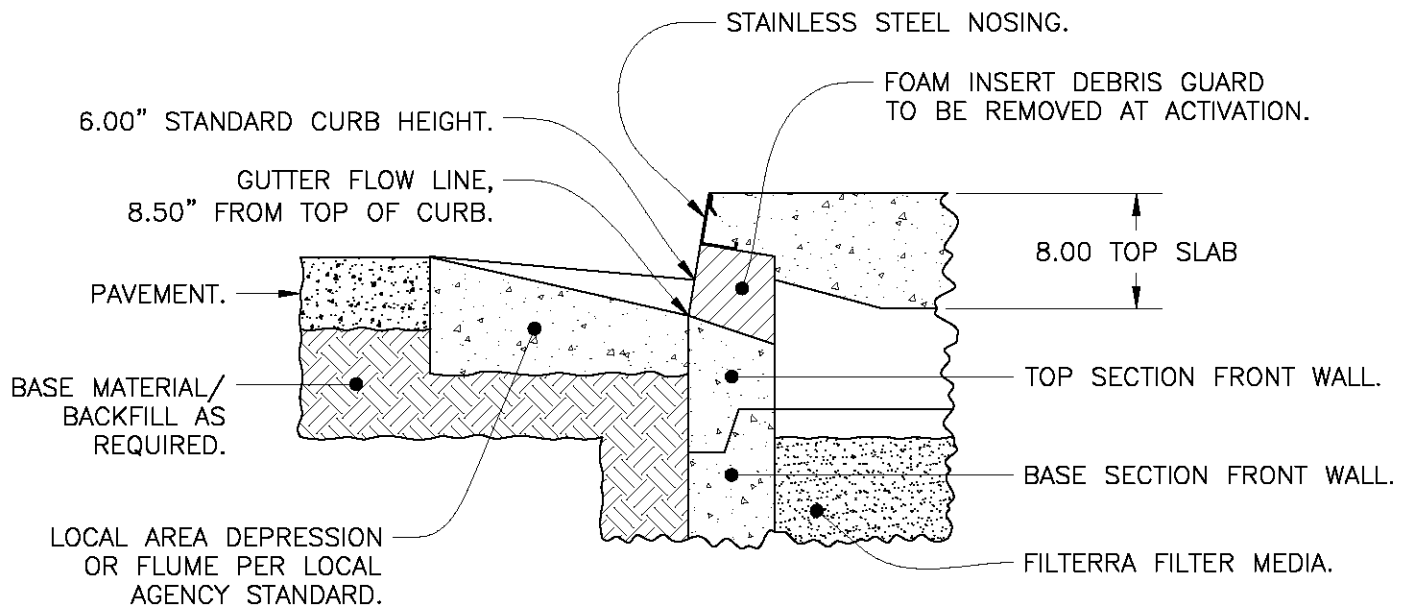
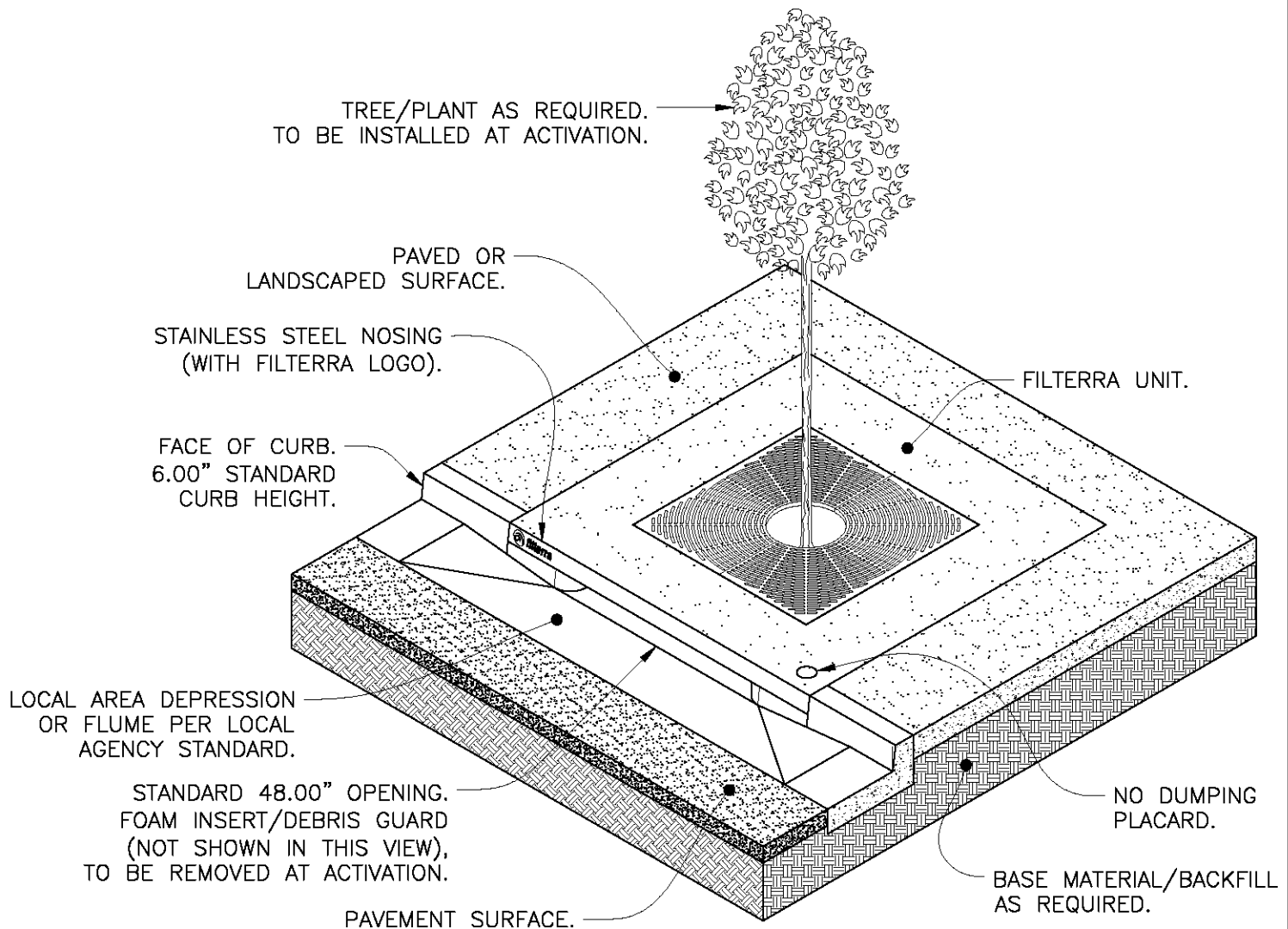
Filtrerra Curb Inlet with Internal Bypass
Everett, WA



Standard Filterra System with Modified Recessed Top
Charlottesville, VA



Standard Filterra System Linear/ROW Application
Mill Creek, WA



CROSS SECTION

MODIFICATION OF DRAWINGS IS PERMITTED ONLY BY WRITTEN AUTHORIZATION FROM KRISTAR ENTERPRISES, INC.

TITLE

Filterra® Precast Curb Inlet Opening and Gutter / Flume Detail



KriStar Enterprises, Inc.

360 Sutton Place, Santa Rosa, CA 95407
Ph: 800.579.8819, Fax: 707.524.8186, www.kristar.com



DRAWING NO.
K-CGT

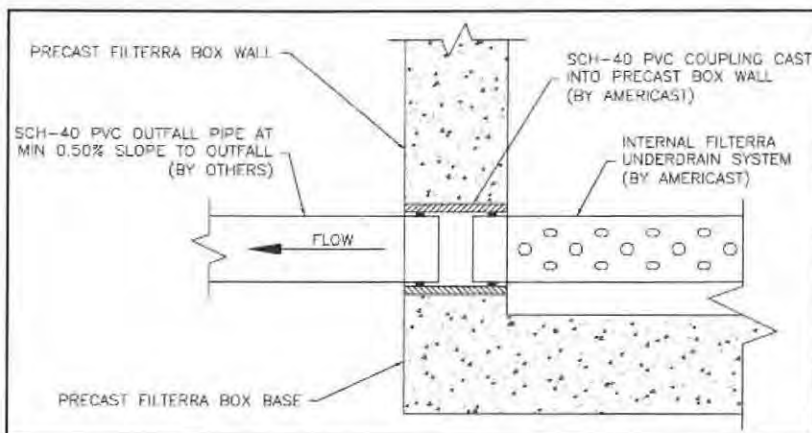
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JPR 1/17/11

Filterra® Piping Technical Details

Filterra® is supplied with an internal underdrain system that exits a wall in a perpendicular direction. Most efficient drainage is accomplished when the drain exits on the lower side of the Filterra®, i.e. nearest the overflow bypass. This is more important when using the larger sized Filterra® Systems.



Drawing DP1:

Section View through Filterra Precast Box Wall at Outfall Pipe Connection

All units are supplied with the drainage pipe coupling precast into the wall, at a depth of 3.50 feet (INV to TC). Drawing DP1 is a detail of the coupling. The coupling used is SCH-40 PVC.

Typically, a minimum slope of 0.5% is adequate to accommodate the flow of treated water from the Filterra®, but each site may present unique conditions based on routing of the outfall pipe (elbows). The pipe must not be a restricting point for the successful operation of Filterra®. All connecting pipes must accommodate freefall flow. Table 3 lists WA DOE approved treatment sizing flow rates of the various size Filterra® units. A safety factor of at least two should be used to size piping from the Filterra based on these conservative approved treatment flow rates.

Table 3: Filterra Flow Rates & Pipe Details

Important Note: Actual flow rate may be more than double rates below.

| Filterra® Size (feet) | Expected Flow Rate (cubic feet/second) | Connecting Drainage Pipe |
|-----------------------|--|--------------------------|
| 4x4 | 0.037 | 4" SCH-40 PVC |
| 4 x 6 or 6 x 4 | 0.061 | 4" SCH-40 PVC |
| 4x6.5 or 6.5x4 | 0.061 | 4" SCH-40 PVC |
| 4 x 8 or 8 x 4 | 0.075 | 4" SCH-40 PVC |
| 4x16 or 16x4 | 0.150 | 6" SCH-40 PVC |
| 6 x 6 | 0.084 | 4" SCH-40 PVC |
| 6 x 8 or 8 x 6 | 0.112 | 4" SCH-40 PVC |
| 6 x 10 or 10 x 6 | 0.140 | 6" SCH-40 PVC |
| 6 x 12 or 12 x 6 | 0.168 | 6" SCH-40 PVC |
| 8x12 or 12x8 | 0.224 | 6" SCH-40 PVC |
| 8x16 or 16x8 | 0.229 | 6" SCH-40 PVC |
| 8x18 or 18x8 | 0.337 | 6" SCH-40 PVC |
| 8x20 or 20x8 | 0.374 | 6" SCH-40 PVC |

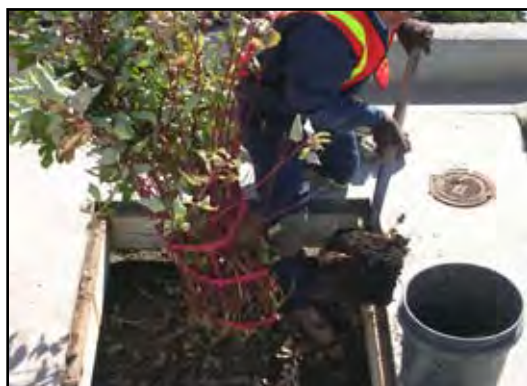
Filterra® Maintenance Steps



1. Inspection of Filterra and surrounding area



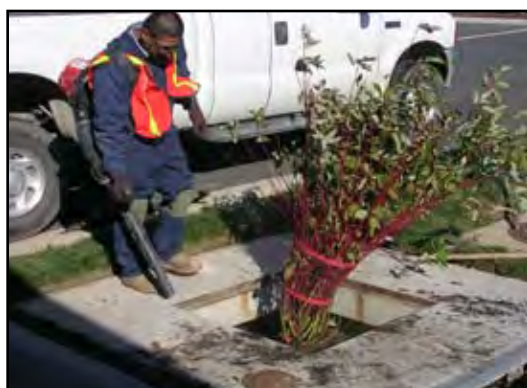
2. Removal of tree grate and erosion control stones



3. Removal of debris, trash and mulch



4. Mulch replacement



5. Clean area around Filterra



6. Complete paperwork and record plant height and width

For additional information please contact your local Filterra sales representative.
Eastern Zone: 866-349-3458, Western Zone: 877-345-1450.

SECTION VII EDUCATIONAL MATERIALS

The educational materials included in this WQMP are provided to inform people involved in future uses, activities, or ownership of the site about the potential pitfalls associated with careless storm water management. "The Ocean Begins at Your Front Door" provides users with information about storm water that is/will be generated on site, what happens when water enters a storm drain, and its ultimate fate, discharging into the ocean. Also included are activities guidelines to educate anyone who is or will be associated with activities that have a potential to impact storm water runoff quality, and provide a menu of BMPs to effectively reduce the generation of storm water runoff pollutants from a variety of activities. The educational materials that may be used for the proposed project are included in Appendix C of this WQMP and are listed below.

| EDUCATION MATERIALS | | | |
|--|-------------------------------------|---|-------------------------------------|
| Residential Materials (http://www.ocwatersheds.com) | Check If Applicable | Business Materials (http://www.ocwatersheds.com) | Check If Applicable |
| The Ocean Begins at Your Front Door | <input checked="" type="checkbox"/> | Tips for the Automotive Industry | <input type="checkbox"/> |
| Tips for Car Wash Fund-raisers | <input type="checkbox"/> | Tips for Using Concrete and Mortar | <input type="checkbox"/> |
| Tips for the Home Mechanic | <input type="checkbox"/> | Tips for the Food Service Industry | <input checked="" type="checkbox"/> |
| Homeowners Guide for Sustainable Water Use | <input type="checkbox"/> | Proper Maintenance Practices for Your Business | <input checked="" type="checkbox"/> |
| Household Tips | <input checked="" type="checkbox"/> | Other Materials (http://www.ocwatersheds.com) (http://www.cabmphandbooks.com) | Check If Attached |
| Proper Disposal of Household Hazardous Waste | <input checked="" type="checkbox"/> | | |
| Recycle at Your Local Used Oil Collection Center (North County) | <input type="checkbox"/> | DF-1 Drainage System Operation & Maintenance | <input checked="" type="checkbox"/> |
| Recycle at Your Local Used Oil Collection Center (Central County) | <input checked="" type="checkbox"/> | R-1 Automobile Repair & Maintenance | <input type="checkbox"/> |
| Recycle at Your Local Used Oil Collection Center (South County) | <input type="checkbox"/> | R-2 Automobile Washing | <input type="checkbox"/> |
| Tips for Maintaining Septic Tank Systems | <input type="checkbox"/> | R-3 Automobile Parking | <input checked="" type="checkbox"/> |
| Responsible Pest Control | <input checked="" type="checkbox"/> | R-4 Home & Garden Care Activities | <input checked="" type="checkbox"/> |
| Sewer Spill | <input type="checkbox"/> | R-5 Disposal of Pet Waste | <input checked="" type="checkbox"/> |
| Tips for the Home Improvement Projects | <input type="checkbox"/> | R-6 Disposal of Green Waste | <input checked="" type="checkbox"/> |
| Tips for Horse Care | <input type="checkbox"/> | R-7 Household Hazardous Waste | <input checked="" type="checkbox"/> |
| Tips for Landscaping and Gardening | <input checked="" type="checkbox"/> | R-8 Water Conservation | <input checked="" type="checkbox"/> |
| Tips for Pet Care | <input checked="" type="checkbox"/> | SD-10 Site Design & Landscape Planning | <input checked="" type="checkbox"/> |
| Tips for Pool Maintenance | <input checked="" type="checkbox"/> | SD-11 Roof Runoff Controls | <input checked="" type="checkbox"/> |
| Tips for Residential Pool, Landscape and Hardscape Drains | <input checked="" type="checkbox"/> | SD-12 Efficient Irrigation | <input checked="" type="checkbox"/> |
| Tips for Projects Using Paint | <input type="checkbox"/> | SD-13 Storm Drain Signage | <input checked="" type="checkbox"/> |
| Other: | <input type="checkbox"/> | SD-31 Maintenance Bays & Docs | <input type="checkbox"/> |
| Other: | <input type="checkbox"/> | SD-32 Trash Storage Areas | <input checked="" type="checkbox"/> |

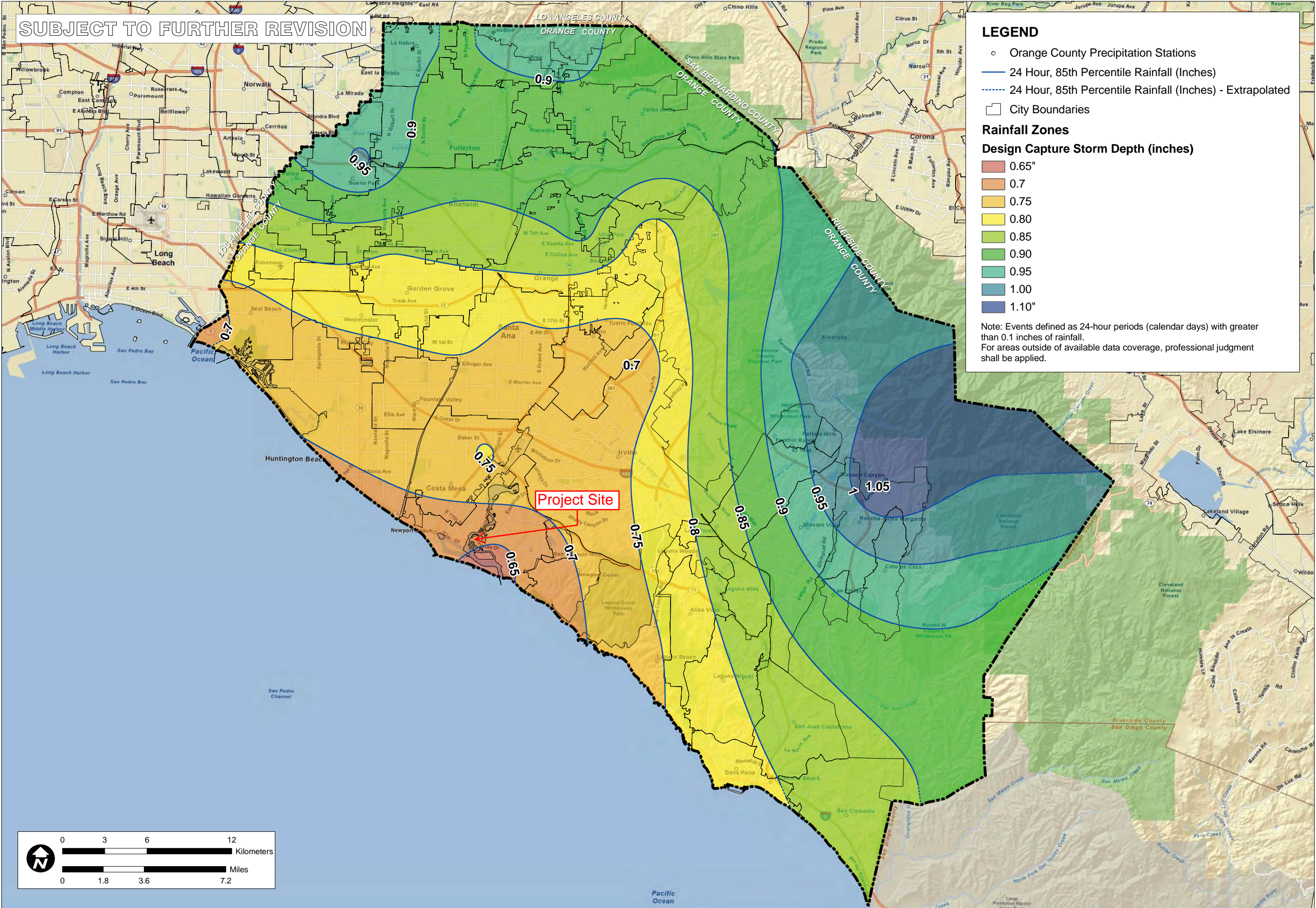
APPENDICES

| | |
|------------------|---------------------------------------|
| Appendix A | Supporting Calculations |
| Appendix B..... | Notice of Transfer of Responsibility |
| Appendix C | Educational Materials |
| Appendix D | BMP Maintenance Supplement / O&M Plan |
| Appendix E..... | Conditions of Approval |

APPENDIX A

SUPPORTING CALCULATIONS

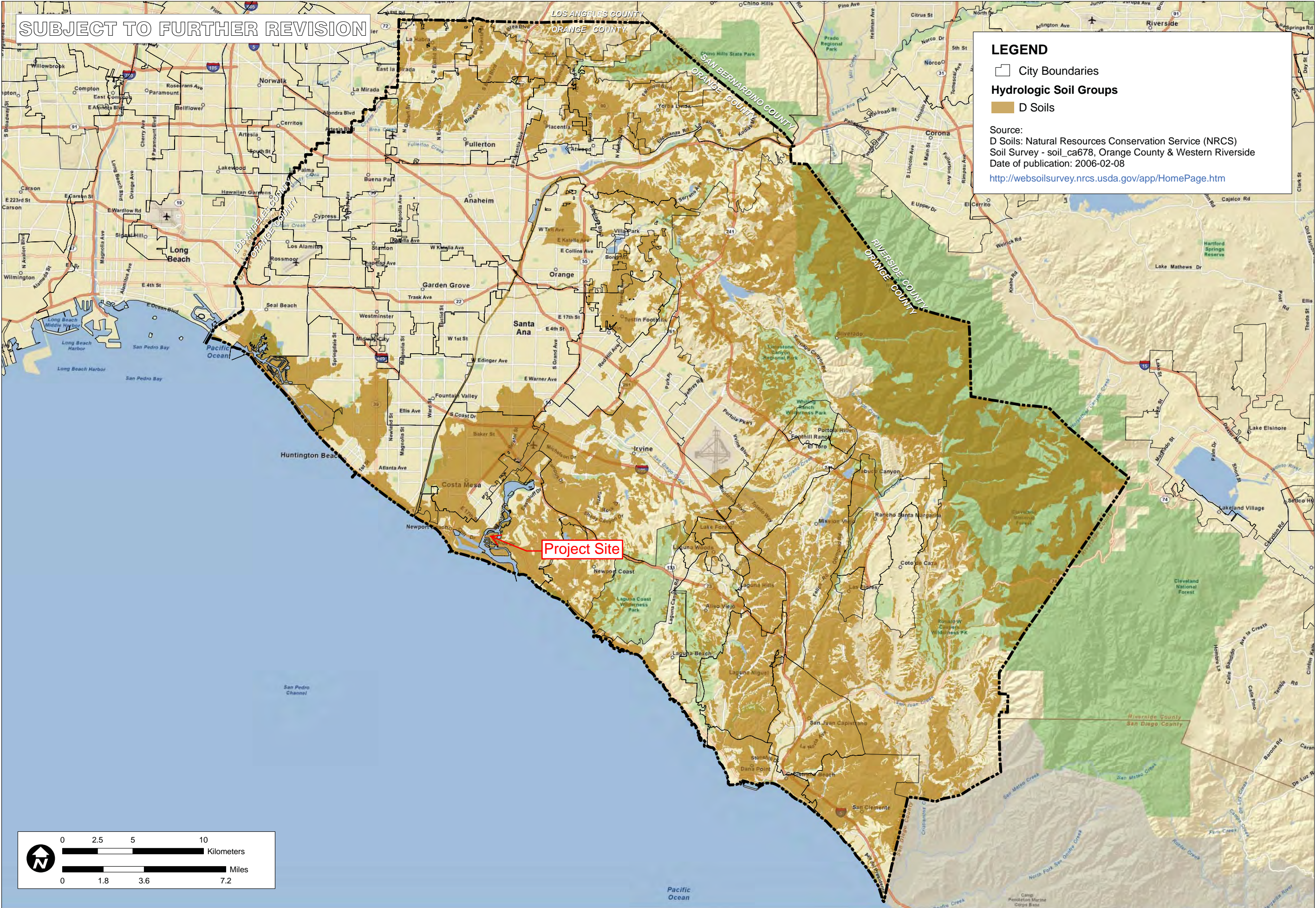
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| | | | |
|---|---------------|----------------|--|
| ORANGE COUNTY TECHNICAL GUIDANCE DOCUMENT | | RAINFALL ZONES | |
| JOB | | TITLE | |
| SCALE 1" = 1.8 miles | | CA | |
| DESIGNED TH | DRAWING TH | ORANGE CO. | |
| CHECKED BMP | DATE 04/22/10 | FIGURE | |
| JOB NO. 9526-E | | XVI-1 | |

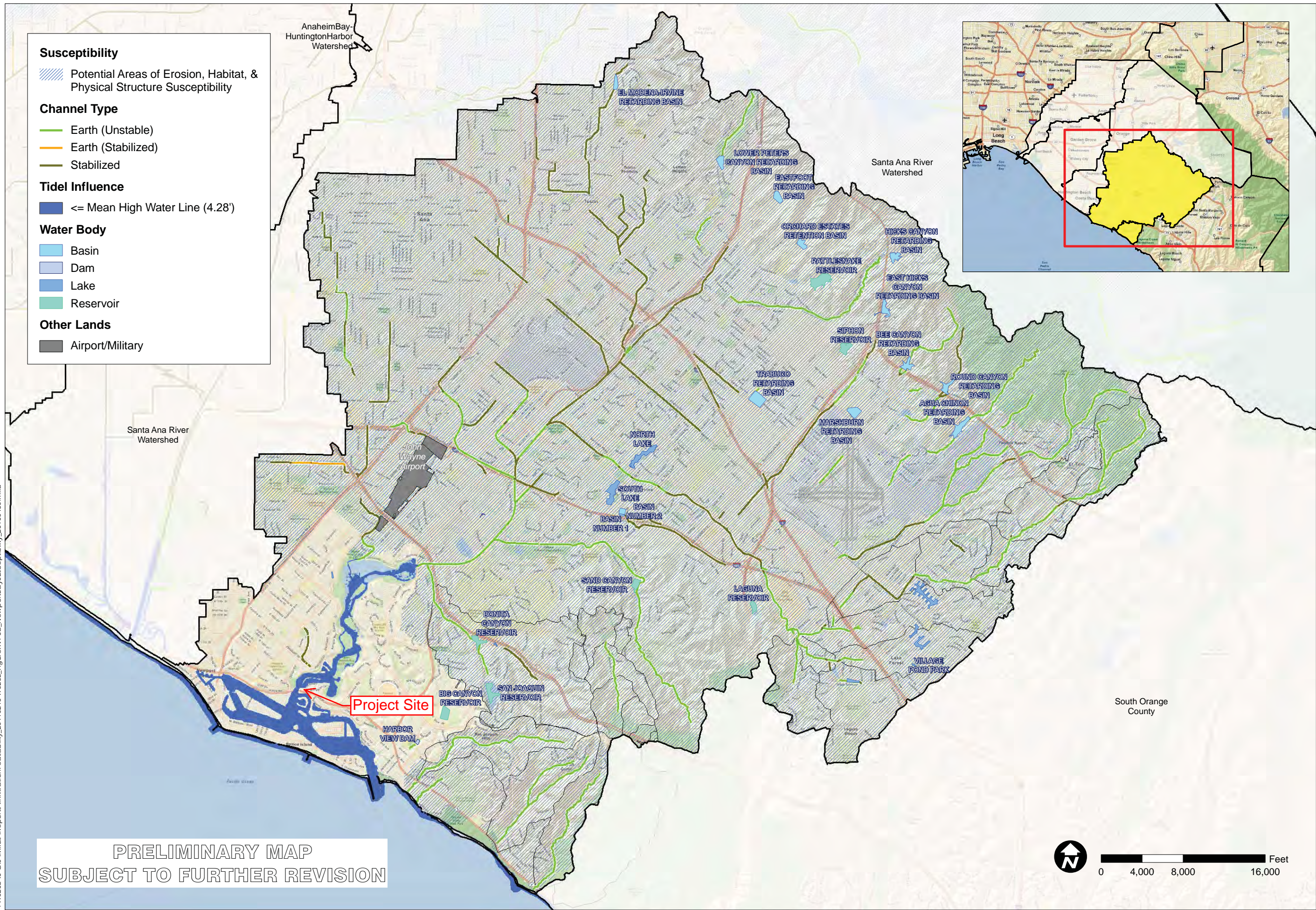
PACE
Advanced Water Engineering

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| | | | |
|---|----------------|-------------------------|--|
|  | | FIGURE | |
| XVI-2b | | | |
| SCALE | 1" = 1.8 miles | JOB | |
| DESIGNED | TH | ORANGE COUNTY | |
| DRAWING | TH | INFILTRATION STUDY | |
| CHECKED | BMP | ORANGE CO. | |
| DATE | 02/09/11 | CA | |
| JOB NO. | 9526-E | | |
| | | HYDROLOGIC SOIL GROUP | |
| | | TYPE D NRCS SOIL SURVEY | |
| | | TITLE | |

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| | | | |
|----------|----------|--|--|
| TITLE | | SUSCEPTIBILITY ANALYSIS NEWPORT BAY- NEWPORT COASTAL STREAMS | |
| JOB | | ORANGE COUNTY WATERSHED MASTER PLANNING | |
| SCALE | | 1" = 4000' | |
| DESIGNED | TH | | |
| DRAWING | TH | | |
| CHECKED | BMP | | |
| DATE | 04/30/10 | | |
| JOB NO. | 9526-E | | |
| FIGURE | | XVI-3d | |

Preliminary Storm Water Quality Design Calculations - Back Bay Landing

6/18/2012

Storm Water Design Capture Volume (DCV)

| | | | | | | | | | | Bio-Treatment | | | | |
|--------------------|--------------|--------------------|-------------------------|-------------------------|----------------------------|----------------------------------|-----------------------|------------------------|---------|----------------------------|---------------------|--|--------------------------|---------------|
| | | | | | | | | | | Bioretention w/ Underdrain | | Proprietary | | |
| Drainage Area Name | % impervious | Runoff Coefficient | Design Storm Depth (in) | Average 2-year Tc (min) | Rainfall Intensity (in/hr) | Drainage Area (ft ²) | Drainage Area (acres) | DCV (ft ³) | Q (cfs) | Ponding Depth (ft) | Depth Filtered (ft) | Surface Area Needed (ft ²) | Minimum Unit Size Needed | Cost Estimate |
| | | 0.15 | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| Total Site | 90% | 0.83 | 0.7 | 10 | 0.23 | 255,262 | 5.86 | 12,358.9 | 1.12 | 0.50 | 0.50 | 12,358.9 | | |
| | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| A1 | 90% | 0.83 | 0.7 | 10 | 0.23 | 40,946 | 0.94 | 1,982.5 | 0.18 | 0.50 | 0.50 | 1,982.5 | 2-8x6 | \$26,800 |
| A1.1 | 85% | 0.79 | 0.7 | 10 | 0.23 | 5,227 | 0.12 | 240.9 | 0.02 | 0.50 | 0.50 | 240.9 | 4x4 | \$8,000 |
| A2 | 95% | 0.86 | 0.7 | 10 | 0.23 | 104,544 | 2.40 | 5,244.6 | 0.47 | 0.50 | 0.50 | 5,244.6 | 3-6x12 | \$60,000 |
| A3 | 90% | 0.83 | 0.7 | 10 | 0.23 | 104,544 | 2.40 | 5,061.7 | 0.46 | 0.50 | 0.50 | 5,061.7 | 3-6x12 | \$60,000 |
| | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| 80% Capture | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| A1 | 90% | 0.83 | 0.175 | 10 | 0.23 | 40,946 | 0.94 | 495.6 | 0.18 | 0.50 | 0.50 | 495.6 | | |
| A1.1 | 85% | 0.79 | 0.175 | 10 | 0.23 | 5,227 | 0.12 | 60.2 | 0.02 | 0.50 | 0.50 | 60.2 | | |
| A2 | 95% | 0.86 | 0.175 | 10 | 0.23 | 104,544 | 2.40 | 1,311.2 | 0.47 | 0.50 | 0.50 | 1,311.2 | | |
| A3 | 90% | 0.83 | 0.175 | 10 | 0.23 | 104,544 | 2.40 | 1,265.4 | 0.46 | 0.50 | 0.50 | 1,265.4 | | |
| Total Site | 90% | 0.83 | 0.175 | 10 | 0.23 | 255,262 | 5.86 | 3,089.7 | 1.12 | 0.50 | 0.50 | 3,089.7 | | |
| | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |
| | | | | | | | 0.00 | 0.0 | 0.00 | 0.50 | 0.50 | 0.0 | | |

assumes Filterra

Worksheet C: Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs

Entire Site

| Step 1: Determine the design capture storm depth used for calculating volume | | | | |
|---|--|--|---------|--------|
| 1 | Enter design capture storm depth from Figure III.1, d (inches) | $d=$ | 0.7 | inches |
| 2 | Enter calculated drawdown time of the proposed BMP based on equation provided in applicable BMP Fact Sheet, T (hours) | $T=$ | 3 | hours |
| 3 | Using Figure III.2, determine the "fraction of design capture storm depth" at which the BMP drawdown time (T) line achieves 80% capture efficiency, X_1 | $X_1=$ | -- | |
| 4 | Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (Worksheet A) | $d_{HSC}=$ | -- | inches |
| 5 | Enter capture efficiency corresponding to d_{HSC} , Y_2 (Worksheet A) | $Y_2=$ | -- | % |
| 6 | Using Figure III.2, determine the fraction of "design capture storm depth" at which the drawdown time (T) achieves the equivalent of the upstream capture efficiency(Y_2), X_2 | $X_2=$ | -- | |
| 7 | Calculate the fraction of design volume that must be provided by BMP, $fraction = X_1 - X_2$ | fraction= | 0.25 | |
| 8 | Calculate the resultant design capture storm depth (inches), $d_{fraction} = fraction \times d$ | $d_{fraction}=$ | 0.175 | inches |
| Step 2: Calculate the DCV | | | | |
| 1 | Enter Project area tributary to BMP (s), A (acres) | $A=$ | 5.86 | acres |
| 2 | Enter Project Imperviousness, imp (unitless) | imp= | 90% | |
| 3 | Calculate runoff coefficient, $C = (0.75 \times imp) + 0.15$ | $C=$ | 0.83 | |
| 4 | Calculate runoff volume, $V_{design} = (C \times d_{fraction} \times A \times 43560 \times (1/12))$ | $V_{design}=$ | 3,089.7 | cu-ft |
| Supporting Calculations | | | | |
| <p>Describe system:</p> <p><i>Bioretention cell with underdrains</i> <i>6" ponding depth</i> <i>24" soil/filtration media depth</i> <i>8" gravel with 6: perforated subdrain</i></p> | | $d_{filtered} = \text{Minimum} \left[\left(\frac{(K_{media} \times T_{routing})}{12} \right), d_p \right]$ $d_{filtered} = \text{Minimum} \left[\left(\frac{(2.5 \frac{in}{hr} \times 3hr)}{12} \right), 0.5 ft \right]$ $A = \frac{DCV}{(d_p + d_{filtered})}$ $A = \frac{3,089.7 ft^3}{(0.5 ft + 0.5 ft)} = 3,089.7 ft^2 \text{ minimum}$ | | |

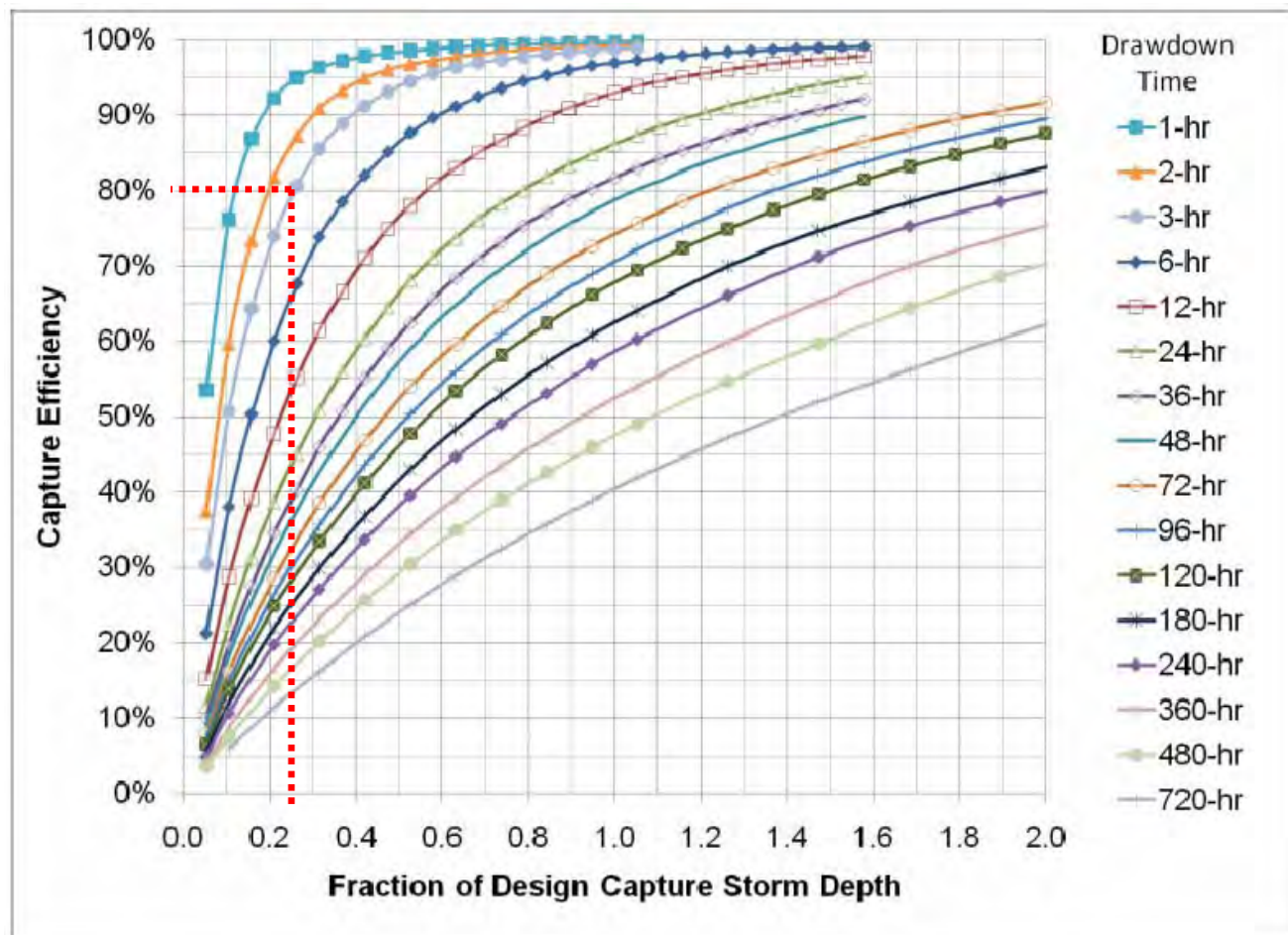
Provide drawdown time calculations per applicable BMP Fact Sheet:

$$\text{Drawdown Time (hr)} = \frac{\text{ponding depth (ft)}}{K_{\text{design}} \left(\frac{\text{in}}{\text{hr}} \right)} \times 12 \text{ in/ft}$$

$$\text{Drawdown Time (hr)} = \frac{.5 \text{ ft}}{2.5 \left(\frac{\text{in}}{\text{hr}} \right)} \times 12 \frac{\text{in}}{\text{ft}} = 2.4 \text{ hours} \text{ --- rounded to 3 hours}$$

Graphical Operations

Figure III.2. Capture Efficiency Nomograph for Constant Drawdown Systems in Orange County



Provide supporting graphical operations. See Example III.6.

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Drainage Area "A1"

| Step 1: Determine the design capture storm depth used for calculating volume | | | | |
|---|---|----------------|------|--------|
| 1 | Enter the time of concentration, T_c (min) (See Appendix IV.2) | $T_c =$ | 10 | min |
| 2 | Using Figure III.4, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1 | $I_1 =$ | 0.23 | in/hr |
| 3 | Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (Worksheet A) | $d_{HSC} =$ | -- | inches |
| 4 | Enter capture efficiency corresponding to d_{HSC} , Y_2 (Worksheet A) | $Y_2 =$ | -- | % |
| 5 | Using Figure III.4, determine the design intensity at which the time of concentration (T_c) achieves the upstream capture efficiency (Y_2), I_2 | $I_2 =$ | -- | in/hr |
| 6 | Determine the design intensity that must be provided by BMP, $I_{design} = I_1 - I_2$ | $I_{design} =$ | 0.23 | in/hr |
| Step 2: Calculate the design flowrate | | | | |
| 1 | Enter Project area tributary to BMP (s), A (acres) | $A =$ | 0.94 | acres |
| 2 | Enter Project Imperviousness, imp (unitless) | $imp =$ | 90 | % |
| 3 | Calculate runoff coefficient, $C = (0.75 \times imp) + 0.15$ | $C =$ | 0.83 | |
| 4 | Calculate design flowrate, $Q_{design} = (C \times I_{design} \times A)$ | $Q_{design} =$ | 0.18 | cfs |
| Supporting Calculations | | | | |
| <p>Describe system:</p> <p><i>Filterra Bioretention Systems, 2 units, 8' x 6' each (treats up to 0.22 cfs)</i></p> | | | | |
| <p>Provide time of concentration assumptions:</p> <p><i>Estimated 10 minutes (pending final storm drain design)</i></p> | | | | |

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Drainage Area "A1.1"

| Step 1: Determine the design capture storm depth used for calculating volume | | | | |
|---|---|----------------|------|--------|
| 1 | Enter the time of concentration, T_c (min) (See Appendix IV.2) | $T_c =$ | 10 | min |
| 2 | Using Figure III.4, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1 | $I_1 =$ | 0.23 | in/hr |
| 3 | Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (Worksheet A) | $d_{HSC} =$ | -- | inches |
| 4 | Enter capture efficiency corresponding to d_{HSC} , Y_2 (Worksheet A) | $Y_2 =$ | -- | % |
| 5 | Using Figure III.4, determine the design intensity at which the time of concentration (T_c) achieves the upstream capture efficiency (Y_2), I_2 | $I_2 =$ | -- | in/hr |
| 6 | Determine the design intensity that must be provided by BMP, $I_{design} = I_1 - I_2$ | $I_{design} =$ | 0.23 | in/hr |
| Step 2: Calculate the design flowrate | | | | |
| 1 | Enter Project area tributary to BMP (s), A (acres) | $A =$ | 0.12 | acres |
| 2 | Enter Project Imperviousness, imp (unitless) | $imp =$ | 85 | % |
| 3 | Calculate runoff coefficient, $C = (0.75 \times imp) + 0.15$ | $C =$ | 0.79 | |
| 4 | Calculate design flowrate, $Q_{design} = (C \times I_{design} \times A)$ | $Q_{design} =$ | 0.02 | cfs |
| Supporting Calculations | | | | |
| <p>Describe system:</p> <p><i>Filtterra Bioretention System, 1 unit, 4' x 4' (treats up to 0.037 cfs)</i></p> | | | | |
| <p>Provide time of concentration assumptions:</p> <p><i>Estimated 10 minutes (pending final storm drain design)</i></p> | | | | |

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Drainage Area "A2"

| Step 1: Determine the design capture storm depth used for calculating volume | | | | |
|---|---|----------------|------|--------|
| 1 | Enter the time of concentration, T_c (min) (See Appendix IV.2) | $T_c =$ | 10 | min |
| 2 | Using Figure III.4, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1 | $I_1 =$ | 0.23 | in/hr |
| 3 | Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (Worksheet A) | $d_{HSC} =$ | -- | inches |
| 4 | Enter capture efficiency corresponding to d_{HSC} , Y_2 (Worksheet A) | $Y_2 =$ | -- | % |
| 5 | Using Figure III.4, determine the design intensity at which the time of concentration (T_c) achieves the upstream capture efficiency (Y_2), I_2 | $I_2 =$ | -- | in/hr |
| 6 | Determine the design intensity that must be provided by BMP, $I_{design} = I_1 - I_2$ | $I_{design} =$ | 0.23 | in/hr |
| Step 2: Calculate the design flowrate | | | | |
| 1 | Enter Project area tributary to BMP (s), A (acres) | $A =$ | 2.4 | acres |
| 2 | Enter Project Imperviousness, imp (unitless) | $imp =$ | 95 | % |
| 3 | Calculate runoff coefficient, $C = (0.75 \times imp) + 0.15$ | $C =$ | 0.86 | |
| 4 | Calculate design flowrate, $Q_{design} = (C \times I_{design} \times A)$ | $Q_{design} =$ | 0.47 | cfs |
| Supporting Calculations | | | | |
| <p>Describe system:</p> <p><i>Filterra Bioretention Systems, 3 units, 6' x 12' each (treats up to 0.5 cfs)</i></p> | | | | |
| <p>Provide time of concentration assumptions:</p> <p><i>Estimated 10 minutes (pending final storm drain design)</i></p> | | | | |

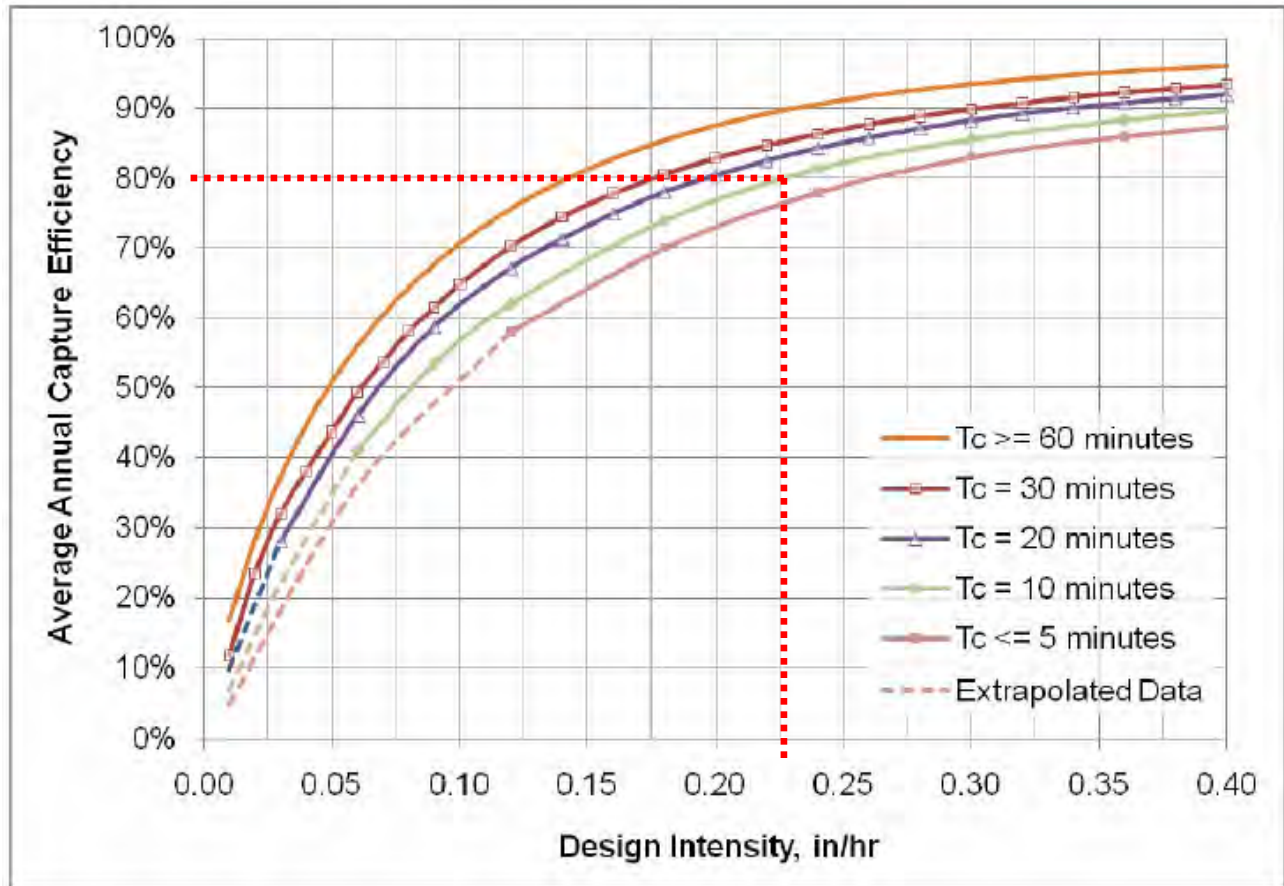
Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Drainage Area "A3"

| Step 1: Determine the design capture storm depth used for calculating volume | | | | |
|---|---|----------------|------|--------|
| 1 | Enter the time of concentration, T_c (min) (See Appendix IV.2) | $T_c =$ | 10 | min |
| 2 | Using Figure III.4, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1 | $I_1 =$ | 0.23 | in/hr |
| 3 | Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (Worksheet A) | $d_{HSC} =$ | -- | inches |
| 4 | Enter capture efficiency corresponding to d_{HSC} , Y_2 (Worksheet A) | $Y_2 =$ | -- | % |
| 5 | Using Figure III.4, determine the design intensity at which the time of concentration (T_c) achieves the upstream capture efficiency (Y_2), I_2 | $I_2 =$ | -- | in/hr |
| 6 | Determine the design intensity that must be provided by BMP, $I_{design} = I_1 - I_2$ | $I_{design} =$ | 0.23 | in/hr |
| Step 2: Calculate the design flowrate | | | | |
| 1 | Enter Project area tributary to BMP (s), A (acres) | $A =$ | 2.4 | acres |
| 2 | Enter Project Imperviousness, imp (unitless) | $imp =$ | 90 | % |
| 3 | Calculate runoff coefficient, $C = (0.75 \times imp) + 0.15$ | $C =$ | 0.83 | |
| 4 | Calculate design flowrate, $Q_{design} = (C \times I_{design} \times A)$ | $Q_{design} =$ | 0.46 | cfs |
| Supporting Calculations | | | | |
| <p>Describe system:</p> <p><i>Filterra Bioretention Systems, 3 units, 6' x 12' each (treats up to 0.5 cfs)</i></p> | | | | |
| <p>Provide time of concentration assumptions:</p> <p><i>Estimated 10 minutes (pending final storm drain design)</i></p> | | | | |

Graphical Operations

Figure III.4. Capture Efficiency Nomograph for Off-line Flow-based Systems in Orange County



Provide supporting graphical operations. See Example III.7.

Worksheet J: Summary of Harvested Water Demand and Feasibility

| | | | | |
|---|--|-------------------|-------|--------|
| 1 | What demands for harvested water exist in the tributary area (check all that apply): | | | |
| 2 | Toilet and urinal flushing | N/A – residential | | |
| 3 | Landscape irrigation | ✓ | | |
| 4 | Other: _____ | N/A | | |
| 5 | What is the design capture storm depth? (Figure III.1) | d | 0.7 | inches |
| 6 | What is the project size? | A | 5.86 | ac |
| 7 | What is the acreage of impervious area? | IA | 5.274 | ac |
| For projects with multiple types of demand (toilet flushing, irrigation demand, and/or other demand) | | | | |
| 8 | What is the minimum use required for partial capture? (Table X.6) | -- | gpd | |
| 9 | What is the project estimated wet season total daily use (Section X.2)? | -- | gpd | |
| 10 | Is partial capture potentially feasible? (Line 9 > Line 8?) | -- | | |
| For projects with only toilet flushing demand | | | | |
| 11 | What is the minimum TUTIA for partial capture? (Table X.7) | -- | | |
| 12 | What is the project estimated TUTIA? | -- | | |
| 13 | Is partial capture potentially feasible? (Line 12 > Line 11?) | -- | | |
| For projects with only irrigation demand | | | | |
| 14 | What is the minimum irrigation area required based on conservation landscape design? (Table X.8) | 4.43 | ac | |
| 15 | What is the proposed project irrigated area? (multiply conservation landscaping by 1; multiply active turf by 2) | 0.586 | ac | |
| 16 | Is partial capture potentially feasible? (Line 15 > Line 14?) | No | | |
| Provide supporting assumptions and citations for controlling demand calculation: | | | | |
| Minimum Irrigated Area per Impervious Area = 0.84 | | | | |
| $0.84 = \frac{\text{irrigated area}}{\text{impervious area}} = \frac{x}{5.274} = 4.43 \text{ ac minimum irrigated area needed}$ | | | | |

Table X.6: Harvested Water Demand Thresholds for Minimum Partial Capture

| Design Capture Storm Depth ¹ , inches | Wet Season Demand Required for Minimum Partial Capture, gpd per impervious acre |
|--|---|
| 0.60 | 490 |
| 0.65 | 530 |
| 0.70 | 570 |
| 0.75 | 610 |
| 0.80 | 650 |
| 0.85 | 690 |
| 0.90 | 730 |
| 0.95 | 770 |
| 1.00 | 810 |

1- Based on isopluvial map (See XIV.1)

Table X.8: Minimum Irrigated Area for Potential Partial Capture Feasibility

| General Landscape Type | Conservation Design: $K_L = 0.35$ | | | Active Turf Areas: $K_L = 0.7$ | | |
|------------------------------------|--|------------------|---------------|--------------------------------|------------------|---------------|
| <i>Closest ET Station</i> | <i>Irvine</i> | <i>Santa Ana</i> | <i>Laguna</i> | <i>Irvine</i> | <i>Santa Ana</i> | <i>Laguna</i> |
| Design Capture Storm Depth, inches | Minimum Required Irrigated Area per Tributary Impervious Acre for Potential Partial Capture, ac/ac | | | | | |
| 0.60 | 0.66 | 0.68 | 0.72 | 0.33 | 0.34 | 0.36 |
| 0.65 | 0.72 | 0.73 | 0.78 | 0.36 | 0.37 | 0.39 |
| 0.70 | 0.77 | 0.79 | 0.84 | 0.39 | 0.39 | 0.42 |
| 0.75 | 0.83 | 0.84 | 0.90 | 0.41 | 0.42 | 0.45 |
| 0.80 | 0.88 | 0.90 | 0.96 | 0.44 | 0.45 | 0.48 |
| 0.85 | 0.93 | 0.95 | 1.02 | 0.47 | 0.48 | 0.51 |
| 0.90 | 0.99 | 1.01 | 1.08 | 0.49 | 0.51 | 0.54 |
| 0.95 | 1.04 | 1.07 | 1.14 | 0.52 | 0.53 | 0.57 |
| 1.00 | 1.10 | 1.12 | 1.20 | 0.55 | 0.56 | 0.60 |

Harvest & Reuse Irrigation Demand Calculations - Back Bay Landing

6/18/2012

Storm Water Design Caputre Volume (SQDV)

| Drainage Area / Land Use Type | % Impervious | Runoff Coefficient | Rainfall Intensity (in) | Drainage Area (acres) | DCV (ft ³) | DCV (gal) |
|-------------------------------|--------------|--------------------|-------------------------|-----------------------|------------------------|-----------|
| entire site | 90% | 0.83 | 0.7 | 5.860 | 12,358.9 | 92,445 |
| | | 0.15 | 0.7 | | 0.0 | 0 |
| | | 0.15 | 0.7 | | 0.0 | 0 |
| | | 0.15 | 0.7 | | 0.0 | 0 |
| | | 0.15 | 0.7 | | 0.0 | 0 |
| | | 0.15 | 0.7 | | 0.0 | 0 |

Irvine Eto
 3.00
 Laguna Beach 2.75
 Santa Ana 2.93

$$\text{Modified EAWU} = \frac{(\text{Eto} \times \text{KL} \times \text{LA} \times 0.015)}{\text{IE}}$$

$$\text{EIATA} = \frac{\text{LA} \times \text{KL}}{(\text{IE} \times \text{Tributary Imp. Area})}$$

High-use Turf Landscaping

| Drainage Area / Land Use Type | Total Area (ac) | Total Area (sf) | % Impervious | Impervious (sf) | Pervious / LA (sf) | Eto | KL | Modified EAWU | EAWU/ Impervious Acre | Minimum EAWU/ Impervious Acre (Table X.6) | Feasible? | EIATA | Minimum EIATA (Table X.8) | Drawdown (days) | Drawdown (hours) | % Capture (Fig. III.2) |
|-------------------------------|-----------------|-----------------|--------------|-----------------|--------------------|------|-----|---------------|-----------------------|---|-----------|---------|---------------------------|-----------------|------------------|------------------------|
| entire site | 5.860 | 255,262 | 90% | 229,736 | 25,526 | 2.75 | 0.7 | 818.97 | 155.28 | 570 | No | 0.09 | 0.51 | 112.9 | 2,709 | |
| 0 | 0.000 | 0 | 0% | 0 | 0 | 2.75 | 0.7 | 0.00 | #DIV/0! | 570 | | #DIV/0! | 0.51 | #DIV/0! | #DIV/0! | |
| 0 | 0.000 | 0 | 0% | 0 | 0 | 2.75 | 0.7 | 0.00 | #DIV/0! | 570 | | #DIV/0! | 0.51 | #DIV/0! | #DIV/0! | |
| 0 | 0.000 | 0 | 0% | 0 | 0 | 2.75 | 0.7 | 0.00 | #DIV/0! | 570 | | #DIV/0! | 0.51 | #DIV/0! | #DIV/0! | |
| 0 | 0.000 | 0 | 0% | 0 | 0 | 2.75 | 0.7 | 0.00 | #DIV/0! | 570 | | #DIV/0! | 0.51 | #DIV/0! | #DIV/0! | |
| 0 | 0.000 | 0 | 0% | 0 | 0 | 2.75 | 0.7 | 0.00 | #DIV/0! | 570 | | #DIV/0! | 0.51 | #DIV/0! | #DIV/0! | |

Low Water Use Landscaping

| Drainage Area / Land Use Type | Total Area (ac) | Total Area (sf) | % Impervious | Impervious (sf) | Pervious / LA (sf) | Eto | KL | Modified EAWU | EAWU/ Impervious Acre | Minimum EAWU/ Impervious Acre (Table X.6) | Feasible? | EIATA | Minimum EIATA (Table X.8) | Drawdown (days) | Drawdown (hours) | % Capture (Fig. III.2) |
|-------------------------------|-----------------|-----------------|--------------|-----------------|--------------------|------|------|---------------|-----------------------|---|-----------|---------|---------------------------|-----------------|------------------|------------------------|
| entire site | 5.860 | 255,262 | 90% | 229,736 | 25,526 | 2.75 | 0.35 | 409.48 | 77.64 | 570 | No | 0.04 | 1.02 | 225.8 | 5,418 | <40% |
| 0 | 0.000 | 0 | 0% | 0 | 0 | 2.75 | 0.35 | 0.00 | #DIV/0! | 570 | | #DIV/0! | 1.02 | #DIV/0! | #DIV/0! | |
| 0 | 0.000 | 0 | 0% | 0 | 0 | 2.75 | 0.35 | 0.00 | #DIV/0! | 570 | | #DIV/0! | 1.02 | #DIV/0! | #DIV/0! | |
| 0 | 0.000 | 0 | 0% | 0 | 0 | 2.75 | 0.35 | 0.00 | #DIV/0! | 570 | | #DIV/0! | 1.02 | #DIV/0! | #DIV/0! | |
| 0 | 0.000 | 0 | 0% | 0 | 0 | 2.75 | 0.35 | 0.00 | #DIV/0! | 570 | | #DIV/0! | 1.02 | #DIV/0! | #DIV/0! | |
| 0 | 0.000 | 0 | 0% | 0 | 0 | 2.75 | 0.35 | 0.00 | #DIV/0! | 570 | | #DIV/0! | 1.02 | #DIV/0! | #DIV/0! | |

Blend of High-Use and Low-Use Landscaping

| Drainage Area / Land Use Type | Total Area (ac) | Total Area (sf) | % Impervious | Impervious (sf) | Pervious / LA (sf) | Eto | KL | Modified EAWU | EAWU/ Impervious Acre | Minimum EAWU/ Impervious Acre (Table X.6) | Feasible? | EIATA | Minimum EIATA (extrapolated) | Drawdown (days) | Drawdown (hours) | % Capture (Fig. III.2) |
|-------------------------------|-----------------|-----------------|--------------|-----------------|--------------------|------|------|---------------|-----------------------|---|-----------|---------|------------------------------|-----------------|------------------|------------------------|
| entire site | 5.860 | 255,262 | 90% | 229,736 | 25,526 | 2.75 | 0.55 | 643.47 | 122.01 | 570 | No | 0.07 | 0.77 | 143.7 | 3,448 | |
| 0 | 0.000 | 0 | 0% | 0 | 0 | 2.75 | 0.55 | 0.00 | #DIV/0! | 570 | | #DIV/0! | 0.77 | #DIV/0! | #DIV/0! | |
| 0 | 0.000 | 0 | 0% | 0 | 0 | 2.75 | 0.55 | 0.00 | #DIV/0! | 570 | | #DIV/0! | 0.77 | #DIV/0! | #DIV/0! | |
| 0 | 0.000 | 0 | 0% | 0 | 0 | 2.75 | 0.55 | 0.00 | #DIV/0! | 570 | | #DIV/0! | 0.77 | #DIV/0! | #DIV/0! | |
| 0 | 0.000 | 0 | 0% | 0 | 0 | 2.75 | 0.55 | 0.00 | #DIV/0! | 570 | | #DIV/0! | 0.77 | #DIV/0! | #DIV/0! | |
| 0 | 0.000 | 0 | 0% | 0 | 0 | 2.75 | 0.55 | 0.00 | #DIV/0! | 570 | | #DIV/0! | 0.77 | #DIV/0! | #DIV/0! | |

TABLE X.6: HARVESTED WATER DEMAND THRESHOLDS FOR MINIMUM PARTIAL CAPTURE

| Design Capture Storm Depth, inches | Wet Season Demand Required for Minimum Partial Capture, gpd per impervious acre |
|------------------------------------|---|
| 0.60 | 490 |
| 0.65 | 530 |
| 0.70 | 570 |
| 0.75 | 610 |
| 0.80 | 650 |
| 0.85 | 690 |
| 0.90 | 730 |
| 0.95 | 770 |
| 1.00 | 810 |

TABLE X.8: MINIMUM IRRIGATED AREA FOR POTENTIAL PARTIAL CAPTURE FEASIBILITY

| General Landscape Type | Conservation Design: KL = 0.35 | | | Active Turf Areas: KL = 0.7 | | |
|------------------------------------|--|-----------|--------|-----------------------------|-------|--------|
| Closest ET Station | Irvine | Santa Ana | Laguna | Irvine | Santa | Laguna |
| Design Capture Storm Depth, inches | Minimum Required Irrigated Area per Tributary Impervious Acre for Potential Partial Capture, ac/ac | | | | | |
| 0.60 | 0.66 | 0.68 | 0.72 | 0.33 | 0.34 | 0.36 |
| 0.65 | 0.72 | 0.73 | 0.78 | 0.36 | 0.37 | 0.39 |
| 0.70 | 0.77 | 0.79 | 0.84 | 0.39 | 0.39 | 0.42 |
| 0.75 | 0.83 | 0.84 | 0.9 | 0.41 | 0.42 | 0.45 |
| 0.80 | 0.88 | 0.9 | 0.96 | 0.44 | 0.45 | 0.48 |
| 0.85 | 0.93 | 0.95 | 1.02 | 0.47 | 0.48 | 0.51 |
| 0.90 | 0.99 | 1.01 | 1.08 | 0.49 | 0.51 | 0.54 |
| 0.95 | 1.04 | 1.07 | 1.14 | 0.52 | 0.53 | 0.57 |
| 1.00 | 1.1 | 1.12 | 1.2 | 0.55 | 0.56 | 0.6 |

Source: Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs). March 22, 2011. Appendix X.

APPENDIX B

NOTICE OF TRANSFER OF RESPONSIBILITY

NOTICE OF TRANSFER OF RESPONSIBILITY

WATER QUALITY MANAGEMENT PLAN

Back Bay Landing 300 E. Coast Highway
Parcel 3 of Parcel Map 93-111

Submission of this Notice Of Transfer of Responsibility constitutes notice to the City of Newport Beach that responsibility for the Water Quality Management Plan ("WQMP") for the subject property identified below, and implementation of that plan, is being transferred from the Previous Owner (and his/her agent) of the site (or a portion thereof) to the New Owner, as further described below.

I. Previous Owner/ Previous Responsible Party Information

| | | | |
|---------------------------|--------|-----------------|--------|
| Company/ Individual Name: | | Contact Person: | |
| Street Address: | | Title: | |
| City: | State: | ZIP: | Phone: |

II. Information about Site Transferred

| | |
|---|--|
| Name of Project (if applicable): | |
| Title of WQMP Applicable to site: | |
| Street Address of Site (if applicable): | |
| Planning Area (PA) and/ or Tract Number(s) for Site: | Lot Numbers (if Site is a portion of a tract): |
| Date WQMP Prepared (and revised if applicable): | |

III. New Owner/ New Responsible Party Information

| | | | |
|---------------------------|--------|-----------------|--------|
| Company/ Individual Name: | | Contact Person: | |
| Street Address: | | Title: | |
| City: | State: | ZIP: | Phone: |

IV. Ownership Transfer Information

| | |
|---|---|
| General Description of Site Transferred to New Owner: | General Description of Portion of Project/ Parcel Subject to WQMP Retained by Owner (if any): |
|---|---|

| |
|--|
| Lot/ Tract Numbers of Site Transferred to New Owner: |
| Remaining Lot/ Tract Numbers Subject to WQMP Still Held by Owner (if any): |
| Date of Ownership Transfer: |

Note: When the Previous Owner is transferring a Site that is a portion of a larger project/ parcel addressed by the WQMP, as opposed to the entire project/parcel addressed by the WQMP, the General Description of the Site transferred and the remainder of the project/ parcel not transferred shall be set forth as maps attached to this notice. These maps shall show those portions of a project/ parcel addressed by the WQMP that are transferred to the New Owner (the Transferred Site), those portions retained by the Previous Owner, and those portions previously transferred by Previous Owner. Those portions retained by Previous Owner shall be labeled as "Previously Transferred".

V. Purpose of Notice of Transfer

The purposes of this Notice of Transfer of Responsibility are: 1) to track transfer of responsibility for implementation and amendment of the WQMP when property to which the WQMP is transferred from the Previous Owner to the New Owner, and 2) to facilitate notification to a transferee of property subject to a WQMP that such New Owner is now the Responsible Party of record for the WQMP for those portions of the site that it owns.

VI. Certifications

A. Previous Owner

I certify under penalty of law that I am no longer the owner of the Transferred Site as described in Section II above. I have provided the New Owner with a copy of the WQMP applicable to the Transferred Site that the New Owner is acquiring from the Previous Owner.

| | |
|--|--------|
| Printed Name of Previous Owner Representative: | Title: |
| Signature of Previous Owner Representative: | Date: |

B. New Owner

I certify under penalty of law that I am the owner of the Transferred Site, as described in Section II above, that I have been provided a copy of the WQMP, and that I have informed myself and understand the New Owner's responsibilities related to the WQMP, its implementation, and Best Management Practices associated with it. I understand that by signing this notice, the New Owner is accepting all ongoing responsibilities for implementation and amendment of the WQMP for the Transferred Site, which the New Owner has acquired from the Previous Owner.

| | |
|---|--------|
| Printed Name of New Owner Representative: | Title: |
| Signature: | Date: |

APPENDIX C

EDUCATIONAL MATERIALS

The Ocean Begins at Your Front Door



PROJECT
Pollution
PREVENTION

Follow these simple steps to help reduce water pollution:

Household Activities

- Do not rinse spills with water. Use dry cleanup methods such as applying cat litter or another absorbent material, sweep and dispose of in the trash. Take items such as used or excess batteries, oven cleaners, automotive fluids, painting products and cathode ray tubes, like TVs and computer monitors, to a Household Hazardous Waste Collection Center (HHWCC).
- For a HHWCC near you call (714) 834-6752 or visit www.oclandfills.com.
- Do not hose down your driveway, sidewalk or patio to the street, gutter or storm drain. Sweep up debris and dispose of it in the trash.

Automotive

- Take your vehicle to a commercial car wash whenever possible. If you wash your vehicle at home, choose soaps, cleaners, or detergents labeled non-toxic, phosphate-free or biodegradable. Vegetable and citrus-based products are typically safest for the environment.
- Do not allow washwater from vehicle washing to drain into the street, gutter or storm drain. Excess washwater should be disposed of in the sanitary sewer (through a sink or toilet) or onto an absorbent surface like your lawn.
- Monitor your vehicles for leaks and place a pan under leaks. Keep your vehicles well maintained to stop and prevent leaks.
- Never pour oil or antifreeze in the street, gutter or storm drain. Recycle these substances at a service station, a waste oil collection center or used oil recycling center. For the nearest Used Oil Collection Center call 1-800-CLEANUP or visit www.1800cleanup.org.

Pool Maintenance

- Pool and spa water must be dechlorinated and free of excess acid, alkali or color to be allowed in the street, gutter or storm drain.
- When it is not raining, drain dechlorinated pool and spa water directly into the sanitary sewer.
- Some cities may have ordinances that do not allow pool water to be disposed of in the storm drain. Check with your city.

Landscape and Gardening

- Do not over-water. Water your lawn and garden by hand to control the amount of water you use or set irrigation systems to reflect seasonal water needs. If water flows off your yard onto your driveway or sidewalk, your system is over-watering. Periodically inspect and fix leaks and misdirected sprinklers.
- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of waste by composting, hauling it to a permitted landfill, or as green waste through your city's recycling program.
- Follow directions on pesticides and fertilizer, (measure, do not estimate amounts) and do not use if rain is predicted within 48 hours.
- Take unwanted pesticides to a HHWCC to be recycled. For locations and hours of HHWCC, call (714) 834-6752 or visit www.oclandfills.com.

Trash

- Place trash and litter that cannot be recycled in securely covered trash cans.
- Whenever possible, buy recycled products.
- Remember: Reduce, Reuse, Recycle.

Pet Care

- Always pick up after your pet. Flush waste down the toilet or dispose of it in the trash. Pet waste, if left outdoors, can wash into the street, gutter or storm drain.
- If possible, bathe your pets indoors. If you must bathe your pet outside, wash it on your lawn or another absorbent/permeable surface to keep the washwater from entering the street, gutter or storm drain.
- Follow directions for use of pet care products and dispose of any unused products at a HHWCC.

Common Pollutants

Home Maintenance

- Detergents, cleaners and solvents
- Oil and latex paint
- Swimming pool chemicals
- Outdoor trash and litter

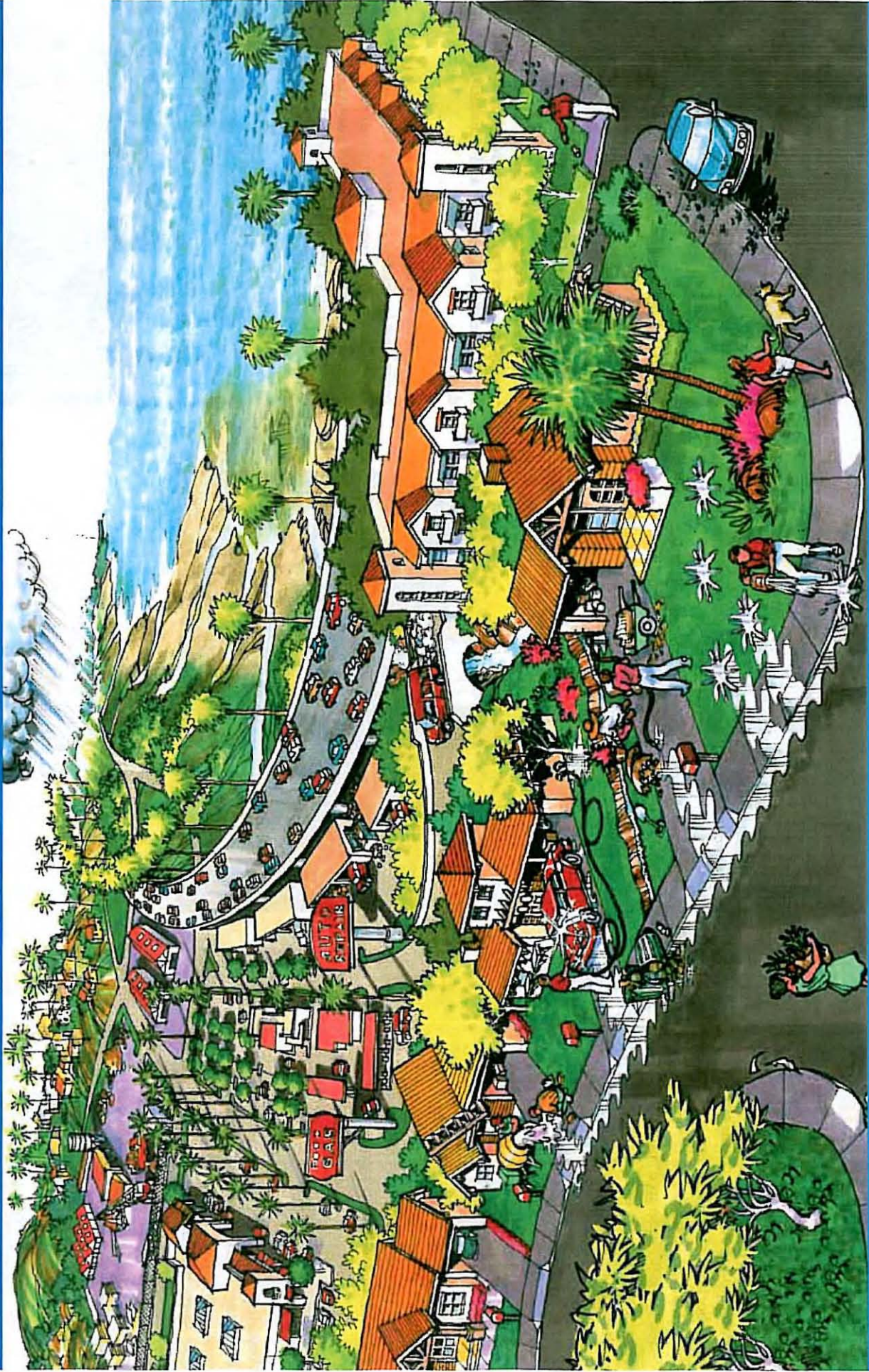
Lawn and Garden

- Pet and animal waste
- Pesticides
- Clippings, leaves and soil
- Fertilizer

Automobile

- Oil and grease
- Radiator fluids and antifreeze
- Cleaning chemicals
- Brake pad dust

The Ocean Begins at Your Front Door



Never allow pollutants to enter the street, gutter or storm drain!

Did You Know?

- Most people believe that the largest source of water pollution in urban areas comes from specific sources such as factories and sewage treatment plants. In fact, the largest source of water pollution comes from city streets, neighborhoods, construction sites and parking lots. This type of pollution is sometimes called “non-point source” pollution.
- There are two types of non-point source pollution: stormwater and urban runoff pollution.
- Stormwater runoff results from rainfall. When rainstorms cause large volumes of water to rinse the urban landscape, picking up pollutants along the way.
- Urban runoff can happen any time of the year when excessive water use from irrigation, vehicle washing and other sources carries trash, lawn clippings and other urban pollutants into storm drains.

Where Does It Go?

- Anything we use outside homes, vehicles and businesses – like motor oil, paint, pesticides, fertilizers and cleaners – can be blown or washed into storm drains.
- A little water from a garden hose or rain can also send materials into storm drains.
- Storm drains are separate from our sanitary sewer systems; unlike water in sanitary sewers (from sinks or toilets), water in storm drains is not treated before entering our waterways.

Sources of Non-Point Source Pollution

- Automotive leaks and spills.
- Improper disposal of used oil and other engine fluids.
- Metals found in vehicle exhaust, weathered paint, rust, metal plating and tires.
- Pesticides and fertilizers from lawns, gardens and farms.
- Improper disposal of cleaners, paint and paint removers.
- Soil erosion and dust debris from landscape and construction activities.
- Litter, lawn clippings, animal waste, and other organic matter.
- Oil stains on parking lots and paved surfaces.



The Effect on the Ocean



Non-point source pollution can have a serious impact on water quality in Orange County. Pollutants from the storm drain system can harm marine life

as well as coastal and wetland habitats. They can also degrade recreation areas such as beaches, harbors and bays.

Stormwater quality management programs have been developed throughout Orange County to educate and encourage the public to protect water quality, monitor runoff in the storm drain system, investigate illegal dumping and maintain storm drains.

Support from Orange County residents and businesses is needed to improve water quality and reduce urban runoff pollution. Proper use and disposal of materials will help stop pollution before it reaches the storm drain and the ocean.



For More Information

Orange County Stormwater Program

California Environmental Protection Agency

www.calepa.ca.gov

- **Air Resources Board**
www.arb.ca.gov
- **Department of Pesticide Regulation**
www.cdpr.ca.gov
- **Department of Toxic Substances Control**
www.dtsc.ca.gov
- **Integrated Waste Management Board**
www.ciwmmb.ca.gov
- **Office of Environmental Health Hazard Assessment**
www.oehha.ca.gov
- **State Water Resources Control Board**
www.waterboards.ca.gov

Earth 911 - Community-Specific Environmental Information 1-800-cleanup or visit www.1800cleanup.org

Health Care Agency's Ocean and Bay Water Closure and Posting Hotline

(714) 433-6400 or visit www.ocbeachinfo.com

Integrated Waste Management Dept. of Orange County (714) 834-6752 or visit www.oclandfills.com for information on household hazardous waste collection centers, recycling centers and solid waste collection

O.C. Agriculture Commissioner

(714) 447-7100 or visit www.ocagcomm.com

Stormwater Best Management Practice Handbook

Visit www.cabmphandbooks.com

UC Master Gardener Hotline

(714) 708-1646 or visit www.uccemg.com

The Orange County Stormwater Program has created and moderates an electronic mailing list to facilitate communications, take questions and exchange ideas among its users about issues and topics related to stormwater and urban runoff and the implementation of program elements. To join the list, please send an email to ocstormwaterinfo-join@list.ocwatersheds.com

| | | |
|--|-------|---------------|
| Aliso Viejo | (949) | 425-2535 |
| Anaheim Public Works Operations | (714) | 765-6860 |
| Brea Engineering | (714) | 990-7666 |
| Buena Park Public Works | (714) | 562-3655 |
| Costa Mesa Public Services | (714) | 754-5323 |
| Cypress Public Works | (714) | 229-6740 |
| Dana Point Public Works | (949) | 248-3584 |
| Fountain Valley Public Works | (714) | 593-4441 |
| Fullerton Engineering Dept. | (714) | 738-6853 |
| Garden Grove Public Works | (714) | 741-5956 |
| Huntington Beach Public Works | (714) | 536-5431 |
| Irvine Public Works | (949) | 724-6315 |
| La Habra Public Services | (562) | 905-9792 |
| La Palma Public Works | (714) | 690-3310 |
| Laguna Beach Water Quality | (949) | 497-0378 |
| Laguna Hills Public Services | (949) | 707-2650 |
| Laguna Niguel Public Works | (949) | 362-4337 |
| Laguna Woods Public Works | (949) | 639-0500 |
| Lake Forest Public Works | (949) | 461-3480 |
| Los Alamitos Community Dev. | (562) | 431-3538 |
| Mission Viejo Public Works | (949) | 470-3056 |
| Newport Beach, Code & Water | | |
| Quality Enforcement | (949) | 644-3215 |
| Orange Public Works | (714) | 532-6480 |
| Placentia Public Works | (714) | 993-8245 |
| Rancho Santa Margarita | (949) | 635-1800 |
| San Clemente Environmental Programs | (949) | 361-6143 |
| San Juan Capistrano Engineering | (949) | 234-4413 |
| Santa Ana Public Works | (714) | 647-3380 |
| Seal Beach Engineering | (562) | 431-2527 x317 |
| Stanton Public Works | (714) | 379-9222 x204 |
| Tustin Public Works/Engineering | (714) | 573-3150 |
| Villa Park Engineering | (714) | 998-1500 |
| Westminster Public Works/Engineering | (714) | 898-3311 x446 |
| Yorba Linda Engineering | (714) | 961-7138 |
| Orange County Stormwater Program | (877) | 897-7455 |
| Orange County 24-Hour | | |
| Water Pollution Problem Reporting Hotline | | |
| 1-877-89-SPILL (1-877-897-7455) | | |

On-line Water Pollution Problem Reporting Form

www.ocwatersheds.com



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Help Prevent Ocean Pollution:

Do your part to prevent water pollution in our creeks, rivers, bays and ocean.

Clean beaches and healthy creeks, rivers, bays, and ocean are important to Orange County. However, many common household activities can lead to water pollution if you're not careful.

**REMEMBER THE
WATER IN YOUR
STORM DRAIN
IS NOT TREATED
BEFORE
IT ENTERS OUR
WATERWAYS**

drains. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated.

You would never pour soap, fertilizers or oil into the ocean, so don't let them enter streets, gutters or storm drains. Follow the easy tips in this brochure to help prevent water pollution.

For more information,
please call the
Orange County Stormwater Program
at **1-877-89-SPILL** (1-877-897-7455)
or visit
www.ocwatersheds.com

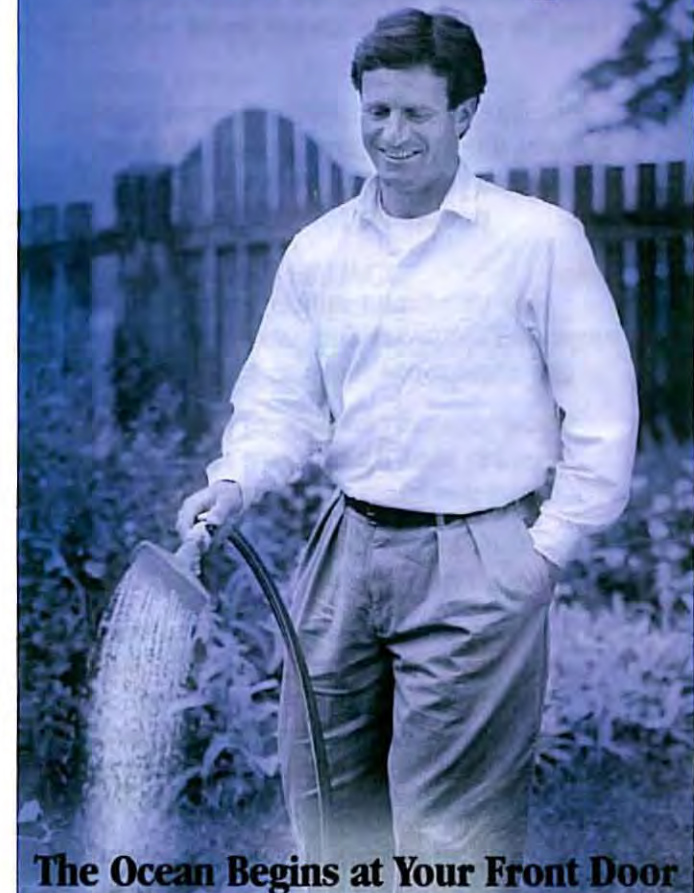
To report a spill,
call the
**Orange County 24-Hour
Water Pollution Problem
Reporting Hotline**
1-877-89-SPILL (1-877-897-7455).

For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while performing everyday household activities. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.



Household Tips



The Ocean Begins at Your Front Door



Pollution Prevention

Household Activities

- **Do not rinse spills with water!** Sweep outdoor spills and dispose of in the trash. For wet spills like oil, apply cat litter or another absorbent material, then sweep and bring to a household hazardous waste collection center (HHWCC).
- Securely cover trash cans.
- Take household hazardous waste to a household hazardous waste collection center.
- Store household hazardous waste in closed, labeled containers inside or under a cover.
- Do not hose down your driveway, sidewalk or patio. Sweep up debris and dispose of in trash.
- Always pick up after your pet. Flush waste down the toilet or dispose of in the trash.
- Bathe pets indoors or have them professionally groomed.

Household Hazardous Wastes include:

- ▲ Batteries
- ▲ Paint thinners, paint strippers and removers
- ▲ Adhesives
- ▲ Drain openers
- ▲ Oven cleaners
- ▲ Wood and metal cleaners and polishes
- ▲ Herbicides and pesticides
- ▲ Fungicides/wood preservatives
- ▲ Automotive fluids and products
- ▲ Grease and rust solvents
- ▲ Thermometers and other products containing mercury
- ▲ Fluorescent lamps
- ▲ Cathode ray tubes, e.g. TVs, computer monitors
- ▲ Pool and spa chemicals

Gardening Activities

- Follow directions on pesticides and fertilizers, (measure, do not estimate amounts) and do not use if rain is predicted within 48 hours.
- Water your lawn and garden by hand to control the amount of water you use. Set irrigation systems to reflect seasonal water needs. If water flows off your yard and onto your driveway or sidewalk, your system is over-watering.
- Mulch clippings or leave them on the lawn. If necessary, dispose in a green waste container.
- Cultivate your garden often to control weeds.

Washing and Maintaining Your Car

- Take your car to a commercial car wash whenever possible.
- Choose soaps, cleaners, or detergents labeled "non-toxic," "phosphate free" or "biodegradable." Vegetable and citrus-based products are typically safest for the environment, **but even these should not be allowed into the storm drain.**
- Shake floor mats into a trash can or vacuum to clean.

- Do not use acid-based wheel cleaners and "hose off" engine degreasers at home. They can be used at a commercial facility, which can properly process the washwater.
- **Do not dump washwater onto your driveway, sidewalk, street, gutter or storm drain.** Excess washwater should be disposed of in the sanitary sewers (through a sink, or toilet) or onto an absorbent surface like your lawn.
- Use a nozzle to turn off water when not actively washing down automobile.
- Monitor vehicles for leaks and place pans under leaks. Keep your car well maintained to stop and prevent leaks.
- Use cat litter or other absorbents and sweep to remove any materials deposited by vehicles. Contain sweepings and dispose of at a HHWCC.
- Perform automobile repair and maintenance under a covered area and use drip pans or plastic sheeting to keep spills and waste material from reaching storm drains.
- **Never pour oil or antifreeze in the street, gutter or storm drains.** Recycle these substances at a service station, HHWCC, or used oil recycling center. For the nearest Used Oil Collection Center call 1-800-CLEANUP or visit www.ciwmb.ca.gov/UsedOil.

For locations and hours of Household Hazardous Waste Collection Centers in Anaheim, Huntington Beach, Irvine and San Juan Capistrano, call (714)834-6752 or visit www.oclandfills.com.

Do your part to prevent water pollution in our creeks, rivers, bays and ocean.

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, not properly disposing of household hazardous waste can lead to water pollution. Batteries, electronics, paint, oil, gardening chemicals, cleaners and other hazardous materials cannot be thrown in the trash. They also must never be poured or thrown into yards, sidewalks, driveways, gutters or streets. Rain or other water could wash the materials into the storm drain and eventually into our waterways and the ocean. In addition, hazardous waste must not be poured in the sanitary sewers (sinks and toilets).

**NEVER DISPOSE
OF HOUSEHOLD
HAZARDOUS
WASTE IN THE
TRASH, STREET,
GUTTER,
STORM DRAIN
OR SEWER.**



For more information,
please call the
Orange County Stormwater Program
at (714) 567-6363
or visit
www.ocwatersheds.com

**To Report Illegal Dumping of
Household Hazardous Waste
call 1-800-69-TOXIC**

To report a spill,
call the
**Orange County 24-Hour
Water Pollution Problem
Reporting Hotline**
(714) 567-6363.

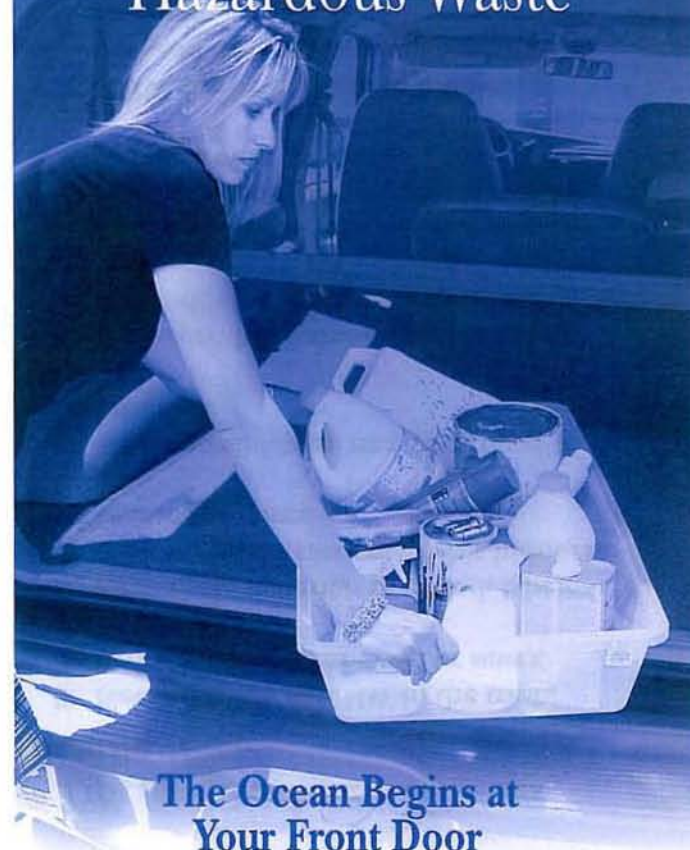
For emergencies, dial 911.



Printed on Recycled Paper

Help Prevent Ocean Pollution:

Proper Disposal of Household Hazardous Waste



**The Ocean Begins at
Your Front Door**

**PROJECT
Pollution
PREVENTION**

ORANGE COUNTY

Pollution Prevention

*WHEN POSSIBLE,
USE
NON-HAZARDOUS
OR
LESS-HAZARDOUS
PRODUCTS.*

Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be "household hazardous waste" or "HHW." HHW can be found throughout your home, including the bathroom, kitchen, laundry room and garage.

Disposal of HHW down the drain, on the ground, into storm drains, or in the trash is illegal and unsafe.

Proper disposal of HHW is actually easy. Simply drop them off at a Household Hazardous Waste Collection Center (HHWCC) for free disposal and recycling. Many materials including anti-freeze, latex-based paint, motor oil and batteries can be recycled. Some centers have a "Stop & Swap" program that lets you take partially used home, garden, and automobile products free of charge. There are four HHWCCs in Orange County:

Anaheim:.....1071 N. Blue Gum St
Huntington Beach:.....17121 Nichols St
Irvine:.....6411 Oak Canyon
San Juan Capistrano:....32250 La Pata Ave

Centers are open Tuesday-Saturday, 9 a.m.-3 p.m. Centers are closed on rainy days and major holidays. For more information, call (714) 834-6752 or visit www.oclandfills.com.

Common household hazardous wastes

- Batteries
- Paint and paint products
- Adhesives
- Drain openers
- Household cleaning products
- Wood and metal cleaners and polishes
- Pesticides
- Fungicides/wood preservatives
- Automotive products (antifreeze, motor oil, fluids)
- Grease and rust solvents
- Fluorescent lamps
- Mercury (thermometers & thermostats)
- All forms of electronic waste including computers and microwaves
- Pool & spa chemicals
- Cleaners
- Medications
- Propane (camping & BBQ)
- Mercury-containing lamps

- Television & monitors (CRTs, flatscreens)

Tips for household hazardous waste

- Never dispose of HHW in the trash, street, gutter, storm drain or sewer.
- Keep these materials in closed, labeled containers and store materials indoors or under a cover.
- When possible, use non-hazardous products.
- Reuse products whenever possible or share with family and friends.
- Purchase only as much of a product as you'll need. Empty containers may be disposed of in the trash.
- HHW can be harmful to humans, pets and the environment. Report emergencies to 911.





Did you know that just one quart of oil can pollute 250,000 gallons of water?

A clean ocean and healthy creeks, rivers, bays and beaches are important to Orange County. However, not properly disposing of used oil can lead to water pollution. If you pour or drain oil onto driveways, sidewalks or streets, it can be washed into the storm drain. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering the ocean. Help prevent water pollution by taking your used oil to a used oil collection center.

Included in this brochure is a list of locations that will accept up to five gallons of used motor oil at no cost. Many also accept used oil filters. Please contact the facility before delivering your used oil. This listing of companies is for your reference and does not constitute a recommendation or endorsement of the company.

Please note that used oil filters may not be disposed of with regular household trash. They must be taken to a household hazardous waste collection or recycling center in Anaheim, Huntington Beach, Irvine or San Juan Capistrano. For information about these centers, visit www.oclandfills.com.

Please do not mix your oil with other substances!

For more information, please call the Orange County Stormwater Program at 1-877-89-SPILL (1-877-897-7455) or visit www.watersheds.com.

For information about the proper disposal of household hazardous waste, call the Household Waste Hotline at (714) 834-6752 or visit www.oclandfills.com.

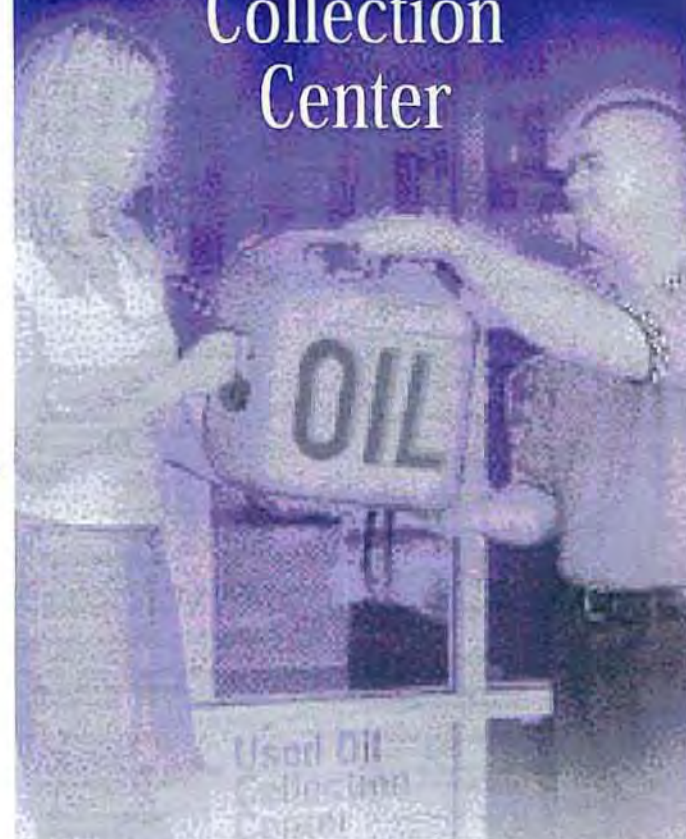


For additional information about the nearest oil recycling center, call the Used Oil Program at 1-800-CLEANUP or visit www.cleanup.org.

DTP113 Rev 8/03
printed on recycled paper

Help Prevent Ocean Pollution:

Recycle at Your Local Used Oil Collection Center



The Ocean Begins at Your Front Door



CENTRAL COUNTY

Used Oil Collection Centers

| | | |
|--|--|--|
| Balboa | John's Boat Service 814 E Bay Ave., Baboos, CA 92681 (949)575-0740 CWMBS: 30-C-03538 | John's Mobil 1465 S Main St., Santa Ana, CA 92707 (714)535-0286 CWMBS: 30-C-00578 |
| Balboa Island Island Marine Fuel 408 S. Bay Front, Balboa Island, CA 92662 (949)673-1103 CWMBS: 30-C-03728 | Kragen Auto Parts #0725 1735 Superior Ave., Costa Mesa, CA 92627 (949)642-3384 CWMBS: 30-C-02864 | Kragen Auto Parts #0726 1302 E 17th St., Santa Ana, CA 92705 (714)533-6081 CWMBS: 30-C-02610 |
| Corona Del Mar Corona Del Mar 78 2201 E. Pacific Coast Hwy., Corona Del Mar, CA 92625 (949)673-3320 CWMBS: 30-C-06820 | Kragen Auto Parts #0728 1175 Baker Blvd., Unit E, Costa Mesa, CA 92626 (714)682-3086 CWMBS: 30-C-02864 | Kragen Auto Parts #1253 1400 W Edinger Ave., Santa Ana, CA 92704 (714)544-1432 CWMBS: 30-C-02827 |
| Corona Del Mar Chevron 2516 E. Coast Hwy., Corona Del Mar, CA 92625 (949)435-0774 CWMBS: 30-C-06424 | Nabors Cadillac 2600 Harbor Blvd., Costa Mesa, CA 92626 (714)444-5200 CWMBS: 30-C-05081 | Kragen Auto Parts #1376 521 W 17th St., Santa Ana, CA 92706 (714)543-4462 CWMBS: 30-C-00391 |
| Mobil (Harbor View) 2500 San Joaquin Hills Rd., Corona Del Mar, CA 92625 (949)640-4759 CWMBS: 30-C-03383 | Oil Stop Inc. Oil Stop Inc., Costa Mesa, CA 92626 (714)434-8500 CWMBS: 30-C-05223 | Kragen Auto Parts #1516 2337 S Bristol Ave., Santa Ana, CA 92704 (714)557-0787 CWMBS: 30-C-04106 |
| Costa Mesa AutoZone #5520 744 W. 19th St., Costa Mesa, CA 92627 (901)495-7159 CWMBS: 30-C-05992 | Plaza Chevron Service Center 3048 Bristol Costa Mesa, CA 92626 (714)542-4277 CWMBS: 30-C-01123 | Kragen Auto Parts #1648 1015 S Main St., Santa Ana, CA 92701 (714)568-1578 CWMBS: 30-C-05964 |
| Big O Tires #5371 3181 Harbor Blvd., Costa Mesa, CA 92626 (949)443-4151 CWMBS: 30-C-04676 | Scher Tire Inc. #15 dha Goodyear Tire 1586 Newport Blvd., Costa Mesa, CA 92627 (949)645-8384 CWMBS: 30-C-00034 | Pep Boys #609 120 E 1st St., Santa Ana, CA 92701 (714)547-7477 CWMBS: 30-C-01738 |
| Big O Tires #694 322 E. 17th St., Costa Mesa, CA 92627 (949)642-4131 CWMBS: 30-C-05811 | Fountain Valley Firestone Store #7147 17975 Magdalena Ave., Fountain Valley, CA 92708 (714)942-3341 CWMBS: 30-C-01219 | Purified Auto Service 2519 S Main St., Santa Ana, CA 92707 (714)545-7900 CWMBS: 30-C-02085 |
| Coast General Performance 2855 Harbor Blvd., Costa Mesa, CA 92626 (714)540-5710 CWMBS: 30-C-05916 | Golden Shell 8520 Warner Ave., Fountain Valley, CA 92708 (714)942-7158 CWMBS: 30-P-05002 | Salom of Santa Ana 1350 Auto Mall Dr., Santa Ana, CA 92705 (714)548-2444 CWMBS: 30-C-05222 |
| Connell Chevrolet 2828 Harbor Blvd., Costa Mesa, CA 92626 (714)546-1200 CWMBS: 30-C-06286 | Kragen Auto Parts #0724 9880 Warner Ave., Fountain Valley, CA 92708 (714)964-5427 CWMBS: 30-C-02609 | Scher Tire #28 1805 N Grand Ave., Santa Ana, CA 92705 (714)558-8644 CWMBS: 30-C-03225 |
| EZ Lube Inc #15 3599 Harbor Blvd., Costa Mesa, CA 92626 (714)968-1647 CWMBS: 30-C-03137 | Kragen Auto Parts #1505 16147 Harbor Blvd., Fountain Valley, CA 92708 (714)531-8625 CWMBS: 30-C-04125 | Tustin Big O Tires #555 131 E 1st St., Tustin, CA 92780 (714)544-9431 CWMBS: 30-C-00972 |
| EZ Lube Inc #46 400 E 17th St., Costa Mesa, CA 92627 (714)556-1312 CWMBS: 30-C-05779 | Oil Can Henry's 9525 Warner Ave., Fountain Valley, CA 92708 (714)737-7795 CWMBS: 30-C-05843 | EZ Lube #42 12372 Newport Ave., Tustin, CA 92780 (714)556-1312 CWMBS: 30-C-06408 |
| EZ Lube Inc #44 2249 Harbor Blvd., Costa Mesa, CA 92627 (714)556-1312 CWMBS: 30-C-05737 | Purified Auto Service #10 16780 Harbor Blvd., Fountain Valley, CA 92708 (714)838-3899 CWMBS: 30-C-01380 | Jiffy Lube #1406 3087 Edinger Ave., Tustin, CA 92780 (949)651-6814 CWMBS: 30-C-03778 |
| Firestone Store #7177 475 E 17th St., Costa Mesa, CA 92627 (949)648-2505 CWMBS: 30-C-02120 | Huntington Beach AutoZone #5528 6800 Warner Ave., Huntington Beach, CA 92647 (714)851-8211 CWMBS: 30-C-04777 | Kragen Auto Parts #1533 502 B E 1st St., Tustin, CA 92780 (714)544-9428 CWMBS: 30-C-04128 |
| Jiffy Lube #1963 300 E 17th St., Costa Mesa, CA 92627 (949)648-4150 CWMBS: 30-C-05553 | Bella Terra Car Wash 16001 Beach Blvd., Huntington Beach, CA 92647 (714)847-4924 CWMBS: 30-C-06195 | Scher Tire Inc #17 dha Goodyear Tire 14511 Radial Ave., Tustin, CA 92780 (714)932-6011 CWMBS: 30-C-00035 |
| Jiffy Lube #1970 2175 Newport Blvd., Costa Mesa, CA 92627 (949)648-4150 CWMBS: 30-C-05554 | Big O Tires #553 19411 Beach Blvd., Huntington Beach, CA 92646 (714)536-7571 CWMBS: 30-C-00970 | Villa Park Pella's Villa Park 76 17771 Sandiego Blvd., Villa Park, CA 92681 (714)937-0854 CWMBS: 30-C-06579 |
| Jiffy Lube #607 2255 Fairview Rd., Costa Mesa, CA 92627 (949)650-5521 | | |

This information was provided by the County of Orange Integrated Waste Management Department and the California Integrated Waste Management Board (CIWMB).



Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities such as pest control can lead to water pollution if you're not careful. Pesticide treatments must be planned and applied properly to ensure that pesticides do not enter the street, gutter or storm drain. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never dump pesticides into the ocean, so don't let it enter the storm drains. Pesticides can cause significant damage to our environment if used improperly. If you are thinking of using a pesticide to control a pest, there are some important things to consider.

For more information,
please call
University of California Cooperative
Extension Master Gardeners at
(714) 708-1646
or visit these Web sites:
www.uccemg.org
www.ipm.ucdavis.edu

For instructions on collecting a specimen
sample visit the Orange County
Agriculture Commissioner's website at:
http://www.ocagcomm.com/ser_lab.asp

To report a spill, call the
**Orange County 24-Hour
Water Pollution Problem
Reporting Hotline**
at 1-877-89-SPILL (1-877-897-7455).

For emergencies, dial 911.

Information From:
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Director; Pamela M. Geisel, Environmental
Horticulture Advisor; Carolyn L. Unruh,
University of California Cooperative
Extension staff writer. Photos courtesy of
the UC Statewide IPM Program and
Darren Haver.

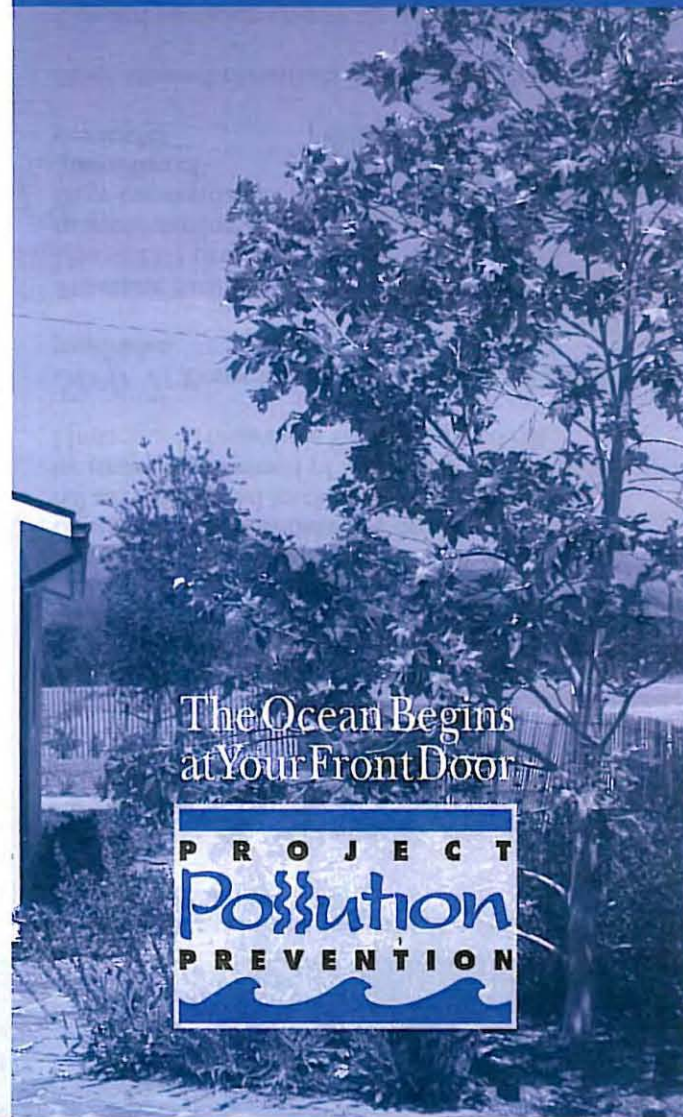
Funding for this brochure has been provided in full
or in part through an agreement with the State Water
Resources Control Board (SWRCB) pursuant to the
Costa-Machado Water Act of 2000 (Prop. 13).



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Help Prevent Ocean Pollution:

Responsible Pest Control



The Ocean Begins
at Your Front Door



Tips for Pest Control

Key Steps to Follow:

Step 1: Correctly identify the pest (insect, weed, rodent, or disease) and verify that it is actually causing the problem.



Three life stages of the common lady beetle, a beneficial insect.

This is important because beneficial insects are often mistaken for pests and sprayed with pesticides needlessly.

Consult with a Certified Nursery

Professional at a local nursery or garden center or send a sample of the pest to the Orange County Agricultural Commissioner's Office.

Determine if the pest is still present – even though you see damage, the pest may have left.

Step 2: Determine how many pests are present and causing damage.



Small pest populations may be controlled more safely using non-pesticide techniques. These include removing food sources, washing off leaves with a strong stream of water, blocking entry into the home using caulking and replacing problem plants with ones less susceptible to pests.

Integrated Pest Management (IPM) usually combines several least toxic pest control methods for long-term prevention and management of pest problems without harming you, your family, or the environment.

Step 3: If a pesticide must be used, choose the least toxic chemical.

Obtain information on the least toxic pesticides that are effective at controlling the target pest from the UC Statewide Integrated Pest Management (IPM) Program's Web site at www.ipm.ucdavis.edu.

Seek out the assistance of a Certified Nursery Professional at a local nursery or garden center when selecting a pesticide. Purchase the smallest amount of pesticide available.

Apply the pesticide to the pest during its most vulnerable life stage. This information can be found on the pesticide label.

Step 4: Wear appropriate protective clothing.

Follow pesticide labels regarding specific types of protective equipment you should wear. Protective clothing should always be washed separately from other clothing.

Step 5: Continuously monitor external conditions when applying pesticides such as weather, irrigation, and the presence of children and animals.

Never apply pesticides when rain is predicted within the next 48 hours. Also, do not water after applying pesticides unless the directions say it is necessary.

Apply pesticides when the air is still; breezy conditions may cause the spray or dust to drift away from your targeted area.

In case of an emergency call 911 and/or the regional poison control number at (714) 634-5988 or (800) 544-4404 (CA only).

For general questions you may also visit www.calpoison.org.

Step 6: In the event of accidental spills, sweep up or use an absorbent agent to remove any excess pesticides. Avoid the use of water.

Be prepared. Have a broom, dust pan, or dry absorbent material, such as cat litter, newspapers or paper towels, ready to assist in cleaning up spills.

Contain and clean up the spill right away. Place contaminated materials in a doubled plastic bag. All materials used to clean up the spill should be properly disposed of according to your local Household Hazardous Waste Disposal site.

Step 7: Properly store and dispose of unused pesticides.

Purchase Ready-To-Use (RTU) products to avoid storing large concentrated quantities of pesticides.



Store unused chemicals in a locked cabinet.

Unused pesticide chemicals may be disposed of at a Household Hazardous Waste Collection Center.

Empty pesticide containers should be triple rinsed prior to disposing of them in the trash.

Household Hazardous Waste
Collection Center
(714) 834-6752
www.oclandfills.com



Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities can lead to water pollution if you're not careful. Fertilizers, pesticides and other chemicals that are left on yards or driveways can be blown or washed into storm drains that flow to the ocean. Overwatering lawns can also send materials into storm drains. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never pour gardening products into the ocean, so don't let them enter the storm drains. Follow these easy tips to help prevent water pollution.

For more information,
please call the
Orange County Stormwater Program
at **1-877-89-SPILL** (1-877-897-7455)
or visit
www.ocwatersheds.com

UCCE Master Gardener Hotline:
(714) 708-1646

To report a spill,
call the
**Orange County 24-Hour
Water Pollution Problem
Reporting Hotline**
1-877-89-SPILL (1-877-897-7455).

For emergencies, dial 911.

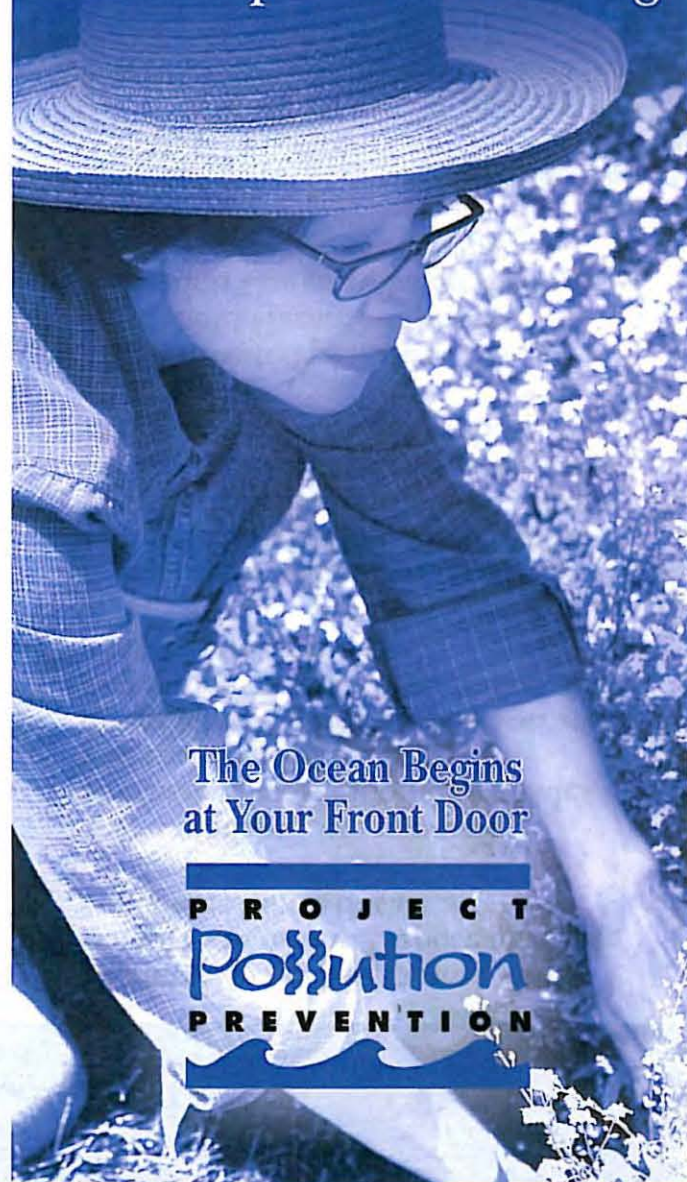
The tips contained in this brochure provide useful information to help prevent water pollution while landscaping or gardening. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.



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Help Prevent Ocean Pollution:

Tips for Landscape & Gardening



**The Ocean Begins
at Your Front Door**

P R O J E C T
Pollution
P R E V E N T I O N

Tips for Landscape & Gardening

Never allow gardening products or polluted water to enter the street, gutter or storm drain.

General Landscaping Tips

- Protect stockpiles and materials from wind and rain by storing them under tarps or secured plastic sheeting.

- Prevent erosion of slopes by planting fast-growing, dense ground covering plants. These will shield and bind the soil.

- Plant native vegetation to reduce the amount of water, fertilizers, and pesticide applied to the landscape.



- Never apply pesticides or fertilizers when rain is predicted within the next 48 hours.

Garden & Lawn Maintenance

- Do not overwater. Use irrigation practices such as drip irrigation, soaker hoses or micro spray systems. Periodically inspect and fix leaks and misdirected sprinklers.

- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of green waste by composting, hauling it to a permitted landfill, or recycling it through your city's program.



- Use slow-release fertilizers to minimize leaching, and use organic fertilizers.

- Read labels and use only as directed. Do not over-apply pesticides or fertilizers. Apply to spots as needed, rather than blanketing an entire area.

- Store pesticides, fertilizers and other chemicals in a dry covered area to prevent exposure that may result in the deterioration of containers and packaging.



- Rinse empty pesticide containers and re-use rinse water as you would use the

product. Do not dump rinse water down storm drains. Dispose of empty containers in the trash.

- When available, use non-toxic alternatives to traditional pesticides, and use pesticides specifically designed to control the pest you are targeting. For more information, visit www.ipm.ucdavis.edu.

- If fertilizer is spilled, sweep up the spill before irrigating. If the spill is liquid, apply an absorbent material such as cat litter, and then sweep it up and dispose of it in the trash.

- Take unwanted pesticides to a Household Hazardous Waste Collection Center to be recycled. Locations are provided below.

Household Hazardous Waste Collection Centers

Anaheim: 1071 N. Blue Gum St.
Huntington Beach: 17121 Nichols St.
Irvine: 6411 Oak Canyon
San Juan Capistrano: 32250 La Pata Ave.

For more information, call (714) 834-6752 or visit www.oilandfills.com



Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities can lead to water pollution if you're not careful. Pet waste and pet care products can be washed into the storm drains that flow to the ocean. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never put pet waste or pet care products into the ocean, so don't let them enter the storm drains. Follow these easy tips to help prevent water pollution.

For more information,
please call the
Orange County Stormwater Program
at **1-877-89-SPILL** (1-877-897-7455)
or visit
www.ocwatersheds.com

To report a spill,
call the
**Orange County 24-Hour
Water Pollution Problem
Reporting Hotline**
1-877-89-SPILL (1-877-897-7455).

For emergencies, dial 911.

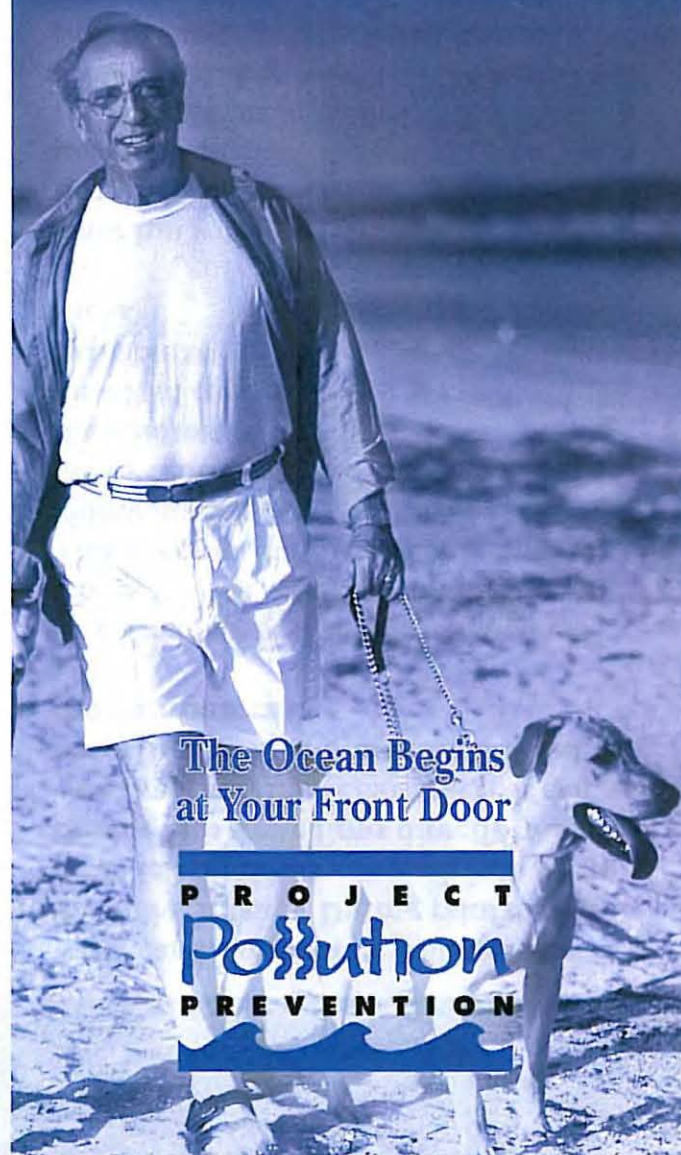
The tips contained in this brochure provide useful information to help prevent water pollution while caring for your pet. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.



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Help Prevent Ocean Pollution:

Tips for Pet Care



The Ocean Begins
at Your Front Door

P R O J E C T
Pollution
P R E V E N T I O N

Tips for Pet Care

Never let any pet care products or washwater run off your yard and into the street, gutter or storm drain.

Washing Your Pets

Even biodegradable soaps and shampoos can be harmful to marine life and the environment.

- If possible, bathe your pets indoors using less-toxic shampoos or have your pet professionally groomed. Follow instructions on the products and clean up spills.
- If you bathe your pet outside, wash it on your lawn or another absorbent/permeable surface to keep the washwater from running into the street, gutter or storm drain.



Flea Control

- Consider using oral or topical flea control products.
- If you use flea control products such as shampoos, sprays or collars, make sure to dispose of any unused products at a Household Hazardous Waste Collection Center. For location information, call (714) 834-6752.



Why You Should Pick Up After Your Pet

It's the law!
Every city has an ordinance requiring you to pick up after your pet. Besides being a nuisance, pet



waste can lead to water pollution, even if you live inland. During rainfall, pet waste left outdoors can wash into storm drains. This waste flows directly into our waterways and the ocean where it can harm human health, marine life and the environment.

As it decomposes, pet waste demands a high level of oxygen from water. This decomposition can contribute to killing marine life by reducing the amount of dissolved oxygen available to them.

Have fun with your pets, but please be a responsible pet owner by taking care of them and the environment.

- Take a bag with you on walks to pick up after your pet.
- Dispose of the waste in the trash or in a toilet.





Clean beaches and healthy creeks, rivers, bays, and ocean are important to Orange County. However, many common activities can lead to water pollution if you're not careful. Swimming pools and spas are common in Orange County, but they must be maintained properly to guarantee that chemicals aren't allowed to enter the street, where they can flow into the storm drains and then into the waterways. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never dump pool chemicals into the ocean, so don't let it enter the storm drains. Follow these easy tips to help prevent water pollution.

For more information,
please call the
Orange County Stormwater Program
at **1-877-89-SPILL** (1-877-897-7455)
or visit
www.ocwatersheds.com

To report a spill,
call the
**Orange County 24-Hour
Water Pollution Reporting Hotline**
1-877-89-SPILL (1-877-897-7455).

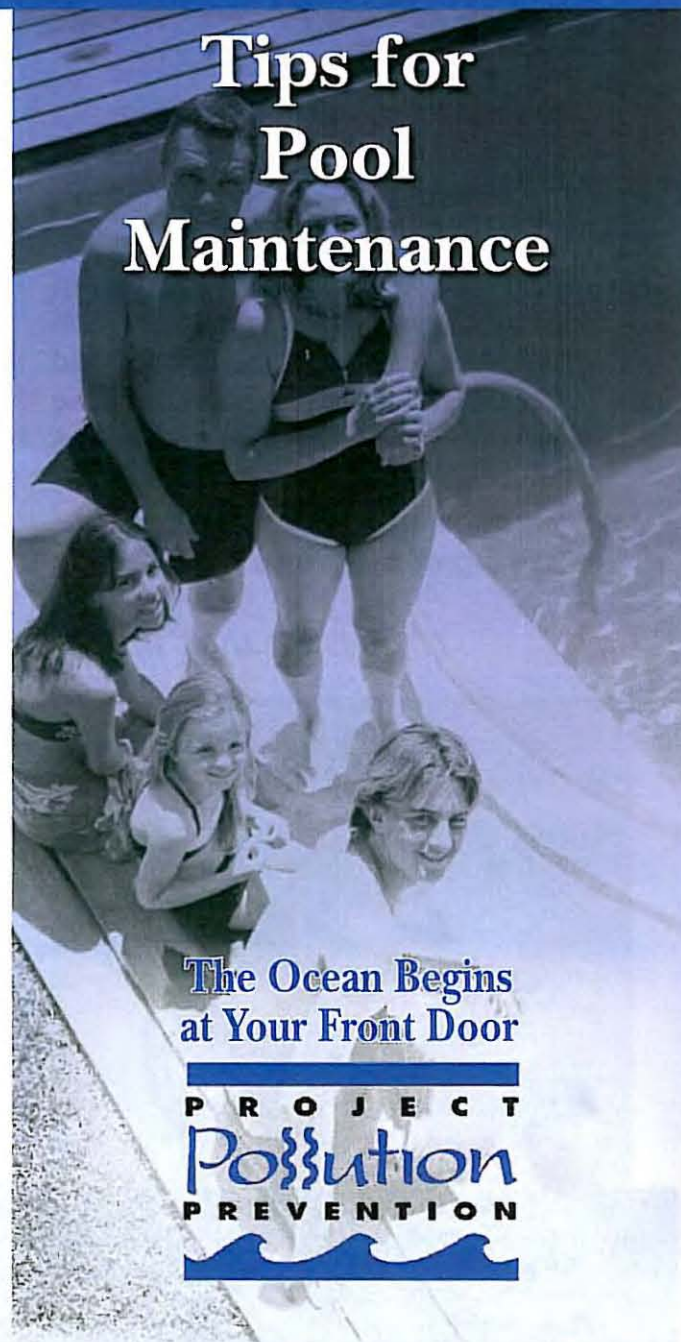
For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while maintaining your pool. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.



Help Prevent Ocean Pollution:

Tips for Pool Maintenance



**The Ocean Begins
at Your Front Door**

P R O J E C T
Pollution
P R E V E N T I O N

Tips for Pool Maintenance

Many pools are plumbed to allow the pool to drain directly to the sanitary sewer. If yours is not, follow these instructions for disposing of pool and spa water.



Acceptable and Preferred Method of Disposal

When you cannot dispose of pool water in the sanitary sewer, the release of dechlorinated swimming pool water is allowed if all of these tips are followed:

- The residual chlorine does not exceed 0.1 mg/l (parts per million).
- The pH is between 6.5 and 8.5.
- The water is free of any unusual coloration, dirt or algae.
- There is no discharge of filter media.
- There is no discharge of acid cleaning wastes.

- Some cities may have ordinances that do not allow pool water to be disposed into a storm drain. Check with your city.

How to Know if You're Following the Standards

You can find out how much chlorine is in your water by using a pool testing kit. Excess chlorine can be removed by discontinuing the use of chlorine for a few days prior to discharge or by purchasing dechlorinating chemicals from a local pool supply company. Always make sure to follow the instructions that come with any products you use.



Doing Your Part

By complying with these guidelines, you will make a significant contribution toward keeping pollutants out of Orange County's creeks, streams, rivers, bays and the ocean. This helps to protect organisms that are sensitive to pool chemicals, and helps to maintain the health of our environment.



For more information,
please call the
Orange County Stormwater Program
at **1-877-89-SPILL** (1-877-897-7455)
or visit
www.ocwatersheds.com

To report a spill,
call the
**Orange County 24-Hour
Water Pollution Problem
Reporting Hotline**
at **1-877-89-SPILL** (1-877-897-7455).

For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.



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Help Prevent Ocean Pollution:

Tips for Residential Pool, Landscape and Hardscape Drains



The Ocean Begins
at Your Front Door



Tips for Residential Pool, Landscape and Hardscape Drains

Pool Maintenance

All pool water discharged to the curb, gutter or permitted pool drain from your property must meet the following water quality criteria:

- The residual chlorine does not exceed 0.1 mg/L (parts per million).
- The pH is between 6.5 and 8.5.
- The water is free of any unusual coloration.
- There is no discharge of filter media or acid cleaning wastes.



Some cities have ordinances that do not allow pool water to be discharged to the storm drain. Check with your city.

Landscape and Hardscape Drains

The following recommendations will help reduce or prevent pollutants from your landscape and hardscape drains from entering the street, gutter or storm drain. Unlike water that enters the sewer (from sinks and toilets), water that enters a landscape or hardscape drain is not treated before entering our creeks, rivers, bays and ocean.

Household Activities

- Do not rinse spills of materials or chemicals to any drain.
- Use dry cleanup methods such as applying cat litter or another absorbent material, then sweep it up and dispose of it in the trash. If the material is hazardous, dispose of it at a Household Hazardous Waste Collection Center (HHWCC). For locations, call (714) 834-6752 or visit www.oclandfills.com.
- Do not hose down your driveways, sidewalks or patios to your landscape or hardscape drain. Sweep up debris and dispose of it in the trash.
- Always pick up after your pet. Flush waste down the toilet or dispose of it in the trash.

- Do not store items such as cleaners, batteries, automotive fluids, paint products, TVs, or computer monitors uncovered outdoors. Take them to a HHWCC for disposal.

Yard Maintenance

- Do not overwater. Water by hand or set automated irrigation systems to reflect seasonal water needs.
- Follow directions on pesticides and fertilizers (measure, do not estimate amounts) and do not use if rain is predicted within 48 hours.
- Cultivate your garden often to control weeds and reduce the need to use chemicals.



Vehicle Maintenance

- Never pour oil or antifreeze down your landscape or hardscape drain. Recycle these substances at a service station, a waste collection center or used oil recycling center. For locations, contact the Used Oil Program at 1-800-CLEANUP or visit www.CLEANUP.org.
- Whenever possible, take your vehicle to a commercial car wash.
- If you do wash your vehicle at home, do not allow the washwater to go down your landscape or hardscape drain. Instead, dispose of it in the sanitary sewer (a sink or toilet) or onto an absorbent surface such as your lawn.
- Use a spray nozzle that will shut off the water when not in use.





Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. Fats, oils and grease from restaurants and food service facilities can cause sewer line blockages that may result in sewage overflow into your facility and into storm drains. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways and should never contain washwater, trash, grease or other materials.

You would never dump oil and trash into the ocean, so don't let it enter the storm drains. Follow these tips to help prevent water pollution.

For more information,
please call the
Orange County Stormwater Program
at **1-877-89-SPILL** (1-877-897-7455)
or visit
www.ocwatersheds.com

Report sewage spills and
discharges that are not
contained to your site to the
**Orange County 24-Hour
Water Pollution Problem
Reporting Hotline**
at **1-877-89-SPILL** (1-877-897-7455)

For emergencies, dial 911.

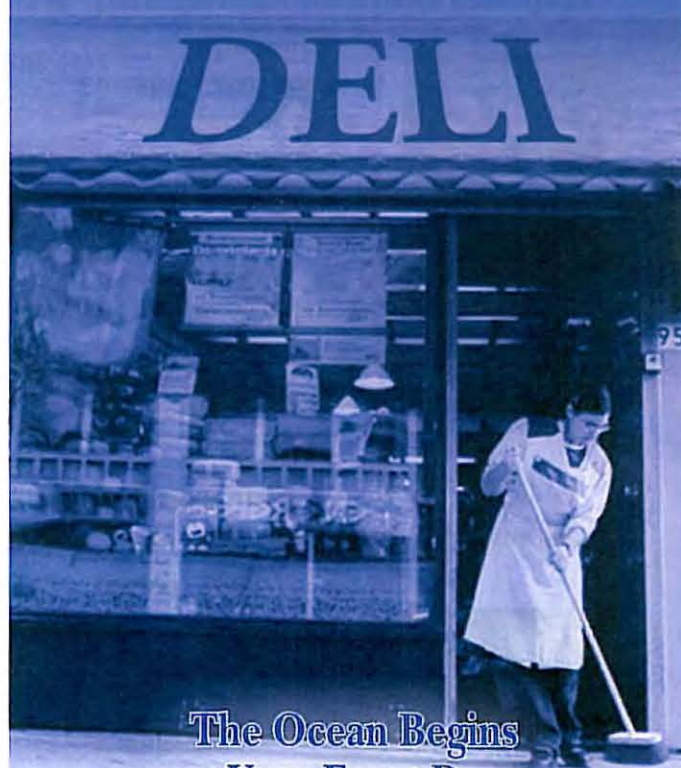
CALIFORNIA
Restaurant ASSOCIATION
SINCE 1906



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Help Prevent Ocean Pollution:

Tips for the Food Service Industry



The Ocean Begins
at Your Front Door

PROJECT
Pollution
PREVENTION

Best Kitchen Practices

Food Waste Disposal

- Scrape food waste off of plates, utensils, pots, food preparation and cooking areas and dispose of it in the trash.
- Never put food waste down the drain. Food scraps often contain grease, which can clog sewer pipes and result in sewage backups and overflows.

Grease & Oil Disposal

- Never put oil or grease down the drain. Contain grease and oil by using covered grease storage containers or installing a grease interceptor.
- Never overfill your grease storage container or transport it without a cover.
- Grease control devices must be emptied and cleaned by permitted companies.
- Keep maintenance records on site.



- For a list of oil/grease recycling companies, contact the CIWMB at www.ciwmb.ca.gov/foodwaste/render.htm or contact your local sanitation district.

Minor Spill Cleanup

- Always use dry cleanup methods, such as a rag, damp mop or broom.
- Never hose a spill into the street, gutter or storm drain.



Major Spill Cleanup

- Have spill containment and clean-up kits readily available, and train all employees on how to use them.
- Immediately contain and clean the spill using dry methods.
- If the spill leaves your site, call (714) 567-6363.

Dumpster Cleanup

- Pick up all debris around the dumpster.
- Always keep the lid on the dumpster closed.
- Never pour liquids into the dumpster or hose it out.



Floor Mat Cleaning

- Sweep the floor mats regularly, discarding the debris into the trash.
- Hose off the mats in a mop sink, at a floor drain, or in an outdoor area that can contain the water.
- Never hose the mats in an area where the wastewater can flow to the street, gutter or storm drain.



Washwater Disposal

- Dispose of washwater in a mop sink or an area with a floor drain.
- Never dispose of washwater in the street, gutter or storm drain.





Preventing water pollution at your commercial/industrial site

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many landscape and building maintenance activities can lead to water pollution if you're not careful. Paint, chemicals, plant clippings and other materials can be blown or washed into storm drains that flow to the ocean. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never pour soap or fertilizers into the ocean, so why would you let them enter the storm drains? Follow these easy tips to help prevent water pollution.

Some types of industrial facilities are required to obtain coverage under the State General Industrial Permit. For more information visit: www.swrcb.ca.gov/stormwater/industrial.html

For more information,
please call the
Orange County Stormwater Program
at **1-877-89-SPILL** (1-877-897-7455)
or visit
www.ocwatersheds.com

To report a spill,
call the
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at **1-877-89-SPILL** (1-877-897-7455).

For emergencies, dial 911.



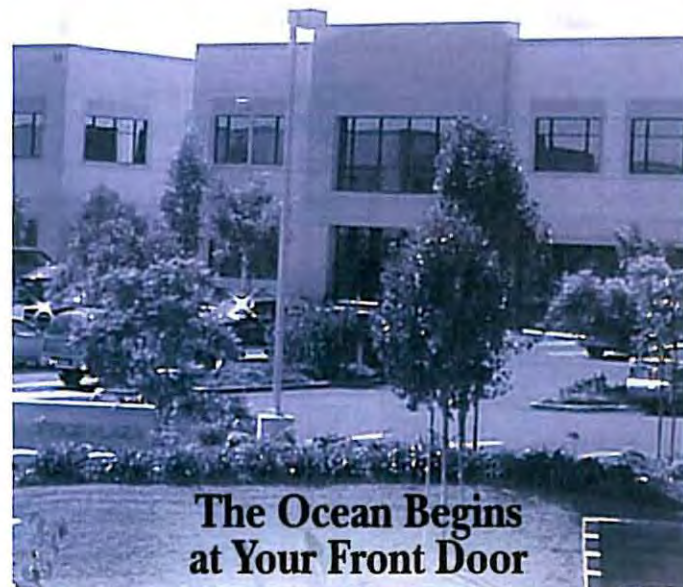
RECYCLE
USED OIL



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Help Prevent Ocean Pollution:

Proper Maintenance Practices for Your Business



**The Ocean Begins
at Your Front Door**

**PROJECT
Pollution
PREVENTION**

Proper Maintenance Practices for your Business

Landscape Maintenance

- Compost grass clippings, leaves, sticks and other vegetation, or dispose of it at a permitted landfill or in green waste containers. Do not dispose of these materials in the street, gutter or storm drain.
- Irrigate slowly and inspect the system for leaks, overspraying and runoff. Adjust automatic timers to avoid overwatering.
- Follow label directions for the use and disposal of fertilizers and pesticides.
- Do not apply pesticides or fertilizers if rain is expected within 48 hours or if wind speeds are above 5 mph.
- Do not spray pesticides within 100 feet of waterways.
- Fertilizers should be worked into the soil rather than dumped onto the surface.
- If fertilizer is spilled on the pavement or sidewalk, sweep it up immediately and place it back in the container.

Building Maintenance

- Never allow washwater, sweepings or sediment to enter the storm drain.
- Sweep up dry spills and use cat litter, towels or similar materials to absorb wet spills. Dispose of it in the trash.
- If you wash your building, sidewalk or parking lot, you **must** contain the water. Use a shop vac to collect the water and contact your city or sanitation agency for proper disposal information. Do not let water enter the street, gutter or storm drain.
- Use drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of materials in the trash.
- Use a ground cloth or oversized tub for mixing paint and cleaning tools.
- Use a damp mop or broom to clean floors.
- Cover dumpsters to keep insects, animals, rainwater and sand from entering. Keep the area around the dumpster clear of trash and debris. Do not overfill the dumpster.

- Call your trash hauler to replace leaking dumpsters.
- Do not dump any toxic substance or liquid waste on the pavement, the ground, or near a storm drain. Even materials that seem harmless such as latex paint or biodegradable cleaners can damage the environment.
- Recycle paints, solvents and other materials. For more information about recycling and collection centers, visit www.oclandfills.com.
- Store materials indoors or under cover and away from storm drains.
- Use a construction and demolition recycling company to recycle lumber, paper, cardboard, metals, masonry, carpet, plastic, pipes, drywall, rocks, dirt, and green waste. For a listing of construction and demolition recycling locations in your area, visit www.ciwmb.ca.gov/recycle.
- Properly label materials. Familiarize employees with Material Safety Data Sheets.

NEVER DISPOSE
OF ANYTHING
IN THE STORM
DRAIN.





DF-1 DRAINAGE FACILITY OPERATION AND MAINTENANCE



As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and storm water that may contain certain pollutants. Consequently these pollutants may accumulate in the system and must be removed periodically. In addition, the systems must also be maintained to function properly hydraulically to avoid flooding. Maintaining the system may involve the following activities:

1. Inspection and Cleaning of Stormwater Conveyance Structures
2. Controlling Illicit Connections and Discharges
3. Controlling Illegal Dumping

This list of Model Maintenance Procedures can be utilized as an inspection checklist to determine where better compliance with Designated Minimum Best Management Practices (notated with checkmarks and capital letters) is needed, and to recommend Additional Best Management Practices (notated with bullet points and lower case letters) that may be applicable under certain circumstances, especially where there are certain Pollutant Constituents of Concern. BMPs applicable to certain constituents are notated as:

Bacteria (BACT) Sediment (SED) Nutrients (NUT) Oil and Grease (O&G) Pesticides (PEST)
Other Toxic Compounds (TOX) Trash (TRASH) Hydrological Impacts (HYD) Any/All or General (ANY)

Program/Facility Being Inspected: _____

Date: _____ Inspector Name: _____

When completed, the checklist should be attached to the General Inspection Form Cover Sheet and copies should be provided to the Supervisor of the Facility/Program being inspected.

MAINTENANCE PROCEDURES:

1. Inspection and Cleaning of Drainage Facilities

| Unsatisfactory | OK |
|--------------------------------|--------------------------|
| <input type="checkbox"/> _____ | <input type="checkbox"/> |
| <input type="checkbox"/> _____ | <input type="checkbox"/> |
| <input type="checkbox"/> _____ | <input type="checkbox"/> |
| <input type="checkbox"/> _____ | <input type="checkbox"/> |
| <input type="checkbox"/> _____ | <input type="checkbox"/> |
| <input type="checkbox"/> _____ | <input type="checkbox"/> |
| <input type="checkbox"/> _____ | <input type="checkbox"/> |
| <input type="checkbox"/> _____ | <input type="checkbox"/> |
| <input type="checkbox"/> _____ | <input type="checkbox"/> |
| <input type="checkbox"/> _____ | <input type="checkbox"/> |

General Guidelines

- T 1A. Annually inspect and clean drainage structures as needed.
- T 1B. Maintain appropriate records of cleaning and inspections.
- T 1C. Properly dispose of removed materials at a landfill or recycling facility.
- T 1D. Conduct intermittent supplemental visual inspections during the wet season to determine if there are problem inlets where sediment/trash or other pollutants accumulate, and provide for additional cleanouts as appropriate.
- T 1E. Prevent or clean up any discharges that may occur during the course of maintenance and cleaning procedures.
- T 1F. Verify that appropriate employees or subcontractors are trained in proper conductance of maintenance activities, including record keeping and disposal.
- T 1G. Annually inspect and clean v-ditches as needed, prior to the wet season. On shrub-covered slopes, vegetative debris may be placed on the downhill side of the ditch. Trash should be bagged and disposed at a landfill.

| Unsatisfactory | OK | General Guidelines (cont.) |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | <ul style="list-style-type: none"> 1a. Remove trash or debris as needed from open channels. It should be noted that major vegetative debris removal may require other regulatory permits prior to completing the work. (TRASH) |
| <input type="checkbox"/> | <input type="checkbox"/> | <ul style="list-style-type: none"> 1b. Consider retrofitting energy dissipaters (e.g. riprap) below culvert outfalls to minimize potential for erosion. (SED) |
| <input type="checkbox"/> | <input type="checkbox"/> | <ul style="list-style-type: none"> 1c. Repair any v-ditches that have cracked or displaced in a manner that accelerates erosion. (SED) |
| <input type="checkbox"/> | <input type="checkbox"/> | <ul style="list-style-type: none"> 1d. If suspicious conditions appear to exist, test selected samples of the removed wastes for compliance with hazardous waste regulations prior to disposal. (TOX) |
| <input type="checkbox"/> | <input type="checkbox"/> | <ul style="list-style-type: none"> 1e. Consider more frequent regular cleaning of selected drainage structures to help address ongoing specific impairments. (SED, BACT, NUT, TRASH) |
| <input type="checkbox"/> | <input type="checkbox"/> | <ul style="list-style-type: none"> 1f. Consider structural retrofits to the MS4 to help address ongoing specific impairments (SED, BACT, NUT, TRASH, O&G) |
| <input type="checkbox"/> | <input type="checkbox"/> | <ul style="list-style-type: none"> 1g. Consider cleaning out pipes at gradient breaks or other in-pipe debris accumulation points as identified/needed. (ANY, BACT, NUT, TRASH) |
| <input type="checkbox"/> | <input type="checkbox"/> | Storm Drain Flushing <ul style="list-style-type: none"> 1h. Flushing of storm drains or storm drain inlets should only be done when critically necessary and no other solution is practical. (SED, BACT, TRASH). |
| <input type="checkbox"/> | <input type="checkbox"/> | <ul style="list-style-type: none"> 1i. If flushed, to the extent practical the material should be collected (vacuumed), treated with an appropriate filtering device to remove sand and debris and disposed of properly. (SED) |
| <input type="checkbox"/> | <input type="checkbox"/> | Waste Management <ul style="list-style-type: none"> 1H. Store wastes collected from cleaning activities of the drainage facilities in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain. |
| <input type="checkbox"/> | <input type="checkbox"/> | <ul style="list-style-type: none"> 1j. Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device to remove the sand and debris prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not permitted, water should be pumped or vacuumed to a tank and properly disposed of. Do not dewater near a storm drain or stream. (SED, TRASH) |
| <input type="checkbox"/> | <input type="checkbox"/> | <ul style="list-style-type: none"> 1k. Provide for laboratory analysis of at least one randomly collected sediment (less the debris) sample per year from the storm drain inlet leaning program to ensure that it does not meet the EPA criteria for hazardous waste. If the sample is determined to be hazardous, the sediment must be disposed of as hazardous waste and the source should be investigated. (TOX). |

| 2. Controlling Illicit Connections and Discharges | |
|---|---|
| <p>Unsatisfactory</p> <p><input type="checkbox"/> _____</p> <p>_____</p> <p><input type="checkbox"/> _____</p> <p>_____</p> <p><input type="checkbox"/> _____</p> <p>_____</p> <p><input type="checkbox"/> _____</p> <p>_____</p> <p><input type="checkbox"/> _____</p> <p>_____</p> | <p>OK</p> <p>General Guidelines</p> <p>T 2A. Report prohibited discharges such as dumping, paint spills, abandoned oil containers, etc. observed during the course of normal daily activities so they can be investigated, contained, and cleaned up.</p> <p>T 2B. Where field observations and/or monitoring data indicate significant problems, conduct field investigations to detect and eliminate existing illicit connections and improper disposal of pollutants into the storm drain (i.e. identify problem areas where discharges or illegal connections may occur and follow up stream to determine the source(s)). (Refer to Appendices A-10 and A-11.)</p> <p>T 2C. Report all observed illicit connections and discharges to the 24-hour water pollution problem reporting hotline (714) 567-6363.</p> <p>T 2D. Encourage public reporting of improper waste disposal by distributing public education materials and advertising the 24-hour water pollution problem reporting hotline.</p> <p>Storm Drain Stenciling ("No Dumping—Drains to Ocean")</p> <p>T 2E. Implement and maintain a storm drain stenciling program.</p> <ul style="list-style-type: none"> 2a. Consider adding the hotline number to the storm drain stencils (BACT, TOX, TRASH). |
| 3. Controlling Illegal Dumping | |
| <p><input type="checkbox"/> _____</p> <p>_____</p> <p><input type="checkbox"/> _____</p> <p>_____</p> <p><input type="checkbox"/> _____</p> <p>_____</p> <p><input type="checkbox"/> _____</p> <p>_____</p> <p><input type="checkbox"/> _____</p> <p>_____</p> | <p>Field Investigation</p> <p>T 3A. Report prohibited discharges such as dumpings observed during the course of normal daily activities so they can be investigated, contained and cleaned up.</p> <p>T 3B. Conduct field investigations to detect and eliminate improper disposal of pollutants into the storm drain (i.e. identify problem areas where discharges or illegal connections may occur and follow up stream to determine the source(s)).</p> <p>T 3C. Report all observed illegal dumping to the 24-hour water pollution problem reporting hotline (714) 567-6363.</p> <p>T 3D. Encourage public reporting of improper waste disposal by distributing public education materials and advertising the 24-hour water pollution problem reporting hotline.</p> <p>T 3E. If perpetrator can be identified, take appropriate enforcement action.</p> <ul style="list-style-type: none"> 3a. Consider posting "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs could also indicate fines and penalties for illegal dumping. (ANY) |

| | |
|---|--|
| <p>Unsatisfactory OK</p> <p><input type="checkbox"/> _____ <input type="checkbox"/></p> <p>_____</p> <p><input type="checkbox"/> _____ <input type="checkbox"/></p> <p>_____</p> <p><input type="checkbox"/> _____ <input type="checkbox"/></p> <p>_____</p> <p>_____</p> <p>_____</p> | <p>Training/Education/Outreach</p> <p>T 3F. Verify that appropriate employees and subcontractors are trained to recognize and report illegal dumping.</p> <p>T 3G. Encourage public reporting of illegal dumping by advertising the 24-hour water pollution problem reporting hotline (714) 567-6363.</p> <ul style="list-style-type: none"> • 3b. Take extra steps to educate the public in neighborhoods where illegal dumping has occurred to inform them why illegal dumping is a problem, and that illegal dumping carries a significant financial penalty. (ANY) |
|---|--|

LIMITATIONS:

Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.



R-3 AUTOMOBILE PARKING

Parked automobiles may contribute pollutants to the storm drain because poorly maintained vehicles may leak fluids containing hydrocarbons, metals, and other pollutants. In addition, heavily soiled automobiles may drop clods of dirt onto the parking surface, contributing to the sediment load when runoff is present. During rain events, or wash-down activities, the pollutants may be carried into the storm drain system. The pollution prevention activities outlined in this fact sheets are used to prevent the discharge of pollutants to the storm drain system.

The activities outlined in this fact sheet target the following pollutants:

| | |
|---------------------------|---|
| Sediment | x |
| Nutrients | |
| Bacteria | |
| Foaming Agents | |
| Metals | X |
| Hydrocarbons | X |
| Hazardous Materials | x |
| Pesticides and Herbicides | |
| Other | |

Think before parking your car. Remember - The ocean starts at your front door.

Required Activities

- If required, vehicles have to be removed from the street during designated street sweeping/cleaning times.
- If the automobile is leaking, place a pan or similar collection device under the automobile, until such time as the leak may be repaired.
- Use dry cleaning methods to remove any materials deposited by vehicles (e.g. adsorbents for fluid leaks, sweeping for soil clod deposits).

Recommended Activities

- Park automobiles over permeable surfaces (e.g. gravel, or porous cement).
- Limit vehicle parking to covered areas.
- Perform routine maintenance to minimize fluid leaks, and maximize fuel efficiency.

For additional information contact:

County of Orange, **OC Watershed**

Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL

or visit our website at: www.ocwatersheds.com



R-4 HOME AND GARDEN CARE ACTIVITIES

HOME CARE

Many hazardous materials may be used in and around residences during routine maintenance activities (such as: oils, paints, cleaners, bleaches, pesticides, glues, solvents, and other products). Improper or excessive use of these products can increase the potential for pollutants to be transported to the storm drain by runoff. The pollution prevention activities outlined in this fact sheet are used to prevent the discharge of pollutants to the storm drain system.

Think before conducting home care activities. Remember - The ocean starts at your front door.

| The activities outlined in this fact sheet target the following pollutants: | |
|---|---|
| Sediment | x |
| Nutrients | |
| Bacteria | x |
| Foaming Agents | x |
| Metals | x |
| Hydrocarbons | x |
| Hazardous Materials | x |
| Pesticides and Herbicides | |
| Other | x |

Required Activities

- Clean out painting equipment in an area where the waste can be contained and properly disposed of (latex - sewer, oil based - household hazardous waste center).
- Rinse off cement mixers and cement laden tools in a contained washout area. Dispose of dried concrete waste in household trash.
- If safe, contain, clean up, and properly dispose all household hazardous waste spills. If an unsafe condition exists, call 911 to activate the proper response team.
- Household hazardous materials must be stored indoors or under cover, and in closed and labeled containers. Dispose of them at a household hazardous waste center.
- Household wash waters (e.g. washer machine effluent, mop water, etc.) must be disposed of in the sanitary sewer.
- Pool and spa water may be discharged to the storm drain if residual chlorine is less than 0.1 mg/L, the pH is between 6.5 and 8.5, and the water is free from any unusual coloration. (Call 714-834-6107 to obtain information on a pool drain permit). Pool filter media must be contained and disposed of properly.

Recommended Activities

- Only purchase the types and amounts of materials needed.
- Share unused portions of products with neighbors or community programs (latex paint)

For additional information contact:

County of Orange, **OC Watershed**

Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL

or visit our website at: www.ocwatersheds.com

GARDEN CARE

Garden activities may contribute pollutants via soil erosion, green waste, fertilizer and pesticide use. Plant and garden care activities such as landscape maintenance, fertilization, and pesticide application have the potential to discharge significant quantities of pollutants to the storm drain system. Nonvegetated surfaces may allow for significant erosion leading to high sediment loads. Other pollutants such as pesticides may adsorb onto the soil particles and be transported off site. Excess fertilizer and pesticide pollutants from over application may be carried to the storm drain by dissolving in irrigation runoff or rainwater. Green wastes may also contain organic matter and may have adsorbed fertilizers and pesticides.

| The activities outlined in this fact sheet target the following pollutants: | |
|---|---|
| Sediment | x |
| Nutrients | x |
| Bacteria | x |
| Foaming Agents | |
| Metals | |
| Hydrocarbons | |
| Hazardous Materials | |
| Pesticides and Herbicides | x |
| Other | x |

Excessive irrigation is often the most significant factor in home and garden care activities. Pollutants may dissolve in irrigation water and then be transported to the storm drain, or particles and materials coated with fertilizers and pesticides may be suspended in the irrigation flow and carried to the storm drain. The pollution prevention activities outlined in this fact sheets are used to prevent the discharge of pollutants to the storm drain system.

Think before conducting garden care activities. Remember - The ocean starts at your front door.

Required Activities

- Irrigation systems must be properly adjusted to reflect seasonal water needs.
- Minimize the use of pesticides and fertilizers. Read the labels and follow directions to avoid improper use. Do not apply chemicals if it is windy or about to rain.
- Properly clean up and dispose of spills of gardening chemicals, fertilizers, or soils. If possible, return the spilled material to the container for future use.
- Lawn and garden care products must be stored in closed labeled containers, in covered areas, or off-ground and under protective tarps.
- Household hazardous waste must be properly disposed at a household hazardous waste center.
- Cover nonvegetated surfaces to prevent erosion.

Recommended Activities

- Utilize xeriscaping and use of drought and insect resistant landscaping.
- Cultivate garden often to control weeds
- Use integrated pest management (IPM). Planting pest repelling plants (e.g. Marigolds) or using pest eating insects (e.g. ladybugs) may reduce the need for pesticides.
- Do not leave food (human or pet) outside overnight
- Remove fruit and garden waste

For additional information contact:

County of Orange, **OC Watershed**

Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL

or visit our website at: www.ocwatersheds.com



R-5 DISPOSAL OF PET WASTES

Pet wastes left in the environment may introduce solids, bacteria, and nutrients to the storm drain. The type and quantity of waste will dictate the proper disposal method. Small quantities of waste are best disposed with regular trash or flushed down a toilet. Large quantities of wastes from herbivore animals may be composted for subsequent use or disposal to landfill.

Pick up after your pet! It's as easy as 1-2-3. 1) Bring a bag. 2) Clean it up. 3) Dispose of it properly (toilet or trash). The pollution prevention activities outlined in this fact sheets are used to prevent the discharge of pollutants to the storm drain system.

| The activities outlined in this fact sheet target the following pollutants: | |
|---|---|
| Sediment | x |
| Nutrients | x |
| Bacteria | x |
| Foaming Agents | |
| Metals | |
| Hydrocarbons | |
| Hazardous Materials | |
| Pesticides and Herbicides | |
| Other | |

Think before you dispose of any pet wastes. Remember - The ocean starts at your front door.

Required Activities

- All pet wastes must be picked up and properly disposed of. Pet waste should be disposed of in the regular trash, flushed down a toilet, or composted as type and quantities dictate.
- Properly dispose of unused flea control products (shampoo, sprays, or collars).
- Manure produced by livestock in uncovered areas should be removed at least daily for composting, or storage in water-tight container prior to disposal. Never hose down to stream or storm drain. Composting or storage areas should be configured and maintained so as not to allow contact with runoff. Compost may be donated to greenhouses, nurseries, and botanical parks. Topsoil companies and composting centers may also accept composted manure.
- Line waste pits or trenches with an impermeable layer, such as thick plastic sheeting.
- When possible, allow wash water to infiltrate into the ground, or collect in an area that is routed to the sanitary sewer.
- Confine livestock in fenced in areas except during exercise and grazing times. Restrict animal access to creeks and streams, preferably by fencing.

For additional information contact:

County of Orange, **OC Watershed**

Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL

or visit our website at: www.ocwatersheds.com

- Install gutters that will divert roof runoff away from livestock areas.

Recommended Activities

- In order to properly dispose of pet waste, carry bags, pooper-scooper, or equivalent to safely pick up pet wastes while walking with pets.
- Bathe pets indoors and use less toxic shampoos. When possible, have pets professionally groomed.
- Properly inoculate your pet in order to maintain their health and reduce the possibility of pathogens in pet wastes.
- Maintain healthy and vigorous pastures with at least three inches of leafy material.
- Consider indoor feeding of livestock during heavy rainfall, to minimize manure exposed to potential runoff.
- Locate barns, corrals, and other high use areas on portions of property that either drain away from or are located distant from nearby creeks or storm drains.

For additional information contact:

County of Orange, **OC Watershed**

Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL

or visit our website at: www.ocwatersheds.com



R-6 DISPOSAL OF GREEN WASTES

Green wastes entering the storm drain may clog the system creating flooding problems. Green wastes washed into receiving waters create an oxygen demand as they are decomposed, reducing the available oxygen for aquatic life. Pesticide and nutrient residues may be carried to the receiving water with the green wastes. The pollution prevention activities outlined in this fact sheets are used to prevent the discharge of pollutants to the storm drain system.

| The activities outlined in this fact sheet target the following pollutants: | |
|---|---|
| Sediment | x |
| Nutrients | x |
| Bacteria | x |
| Foaming Agents | |
| Metals | |
| Hydrocarbons | |
| Hazardous Materials | x |
| Pesticides and Herbicides | x |
| Other | |

Think before disposing of any green wastes - Remember - The ocean starts at your front door.

Required Activities

- Green wastes can not be disposed of in the street, gutter, public right-of-way, storm drain, or receiving water. Dispose of green wastes as a part of the household trash. If the quantities are too large, arrange a pick up with the local waste hauler.
- After conducting yard or garden activities sweep the area and properly dispose of the clippings and waste. Do not sweep or blow out into the street or gutter.

Recommended Activities

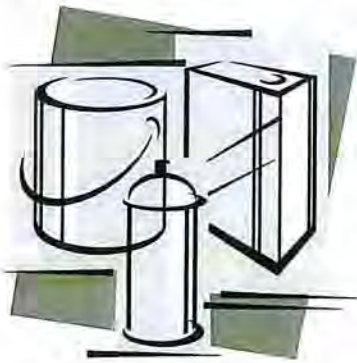
- Utilize a commercial landscape company to conduct the landscape activities and waste disposal.
- Utilize native plants and drought tolerant species to reduce the water use and green waste produced.
- Use a lawn mower that has a mulcher so that the grass clippings remain on the lawn and do not have to be collected and disposed of.
- Compost materials in a designated area within the yard.
- Recycle lawn clippings and greenery waste through local programs if available.

For additional information contact:

County of Orange, **OC Watershed**

Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL

or visit our website at: www.ocwatersheds.com



R-7 HOUSEHOLD HAZARDOUS WASTE

Household hazardous wastes (HHW) are defined as waste materials which are typically found in homes or similar sources, which exhibit characteristics such as: corrosivity, ignitability, reactivity, and/or toxicity, or are listed as hazardous materials by EPA.

List of most common HHW products:

Drain openers
Oven cleaners
Wood and metal cleaners and polishes
Automotive oil and fuel additives
Grease and rust solvents
Carburetor and fuel injection cleaners
Starter fluids
Batteries
Paint Thinners
Paint strippers and removers
Adhesives
Herbicides
Pesticides
Fungicides/wood preservatives

Many types of waste can be recycled, however options for each waste type are limited. Recycling is always preferable to disposal of unwanted materials. All gasoline, antifreeze, waste oil, and lead-acid batteries can be recycled. Latex and oil-based paint can be reused, as well as recycled. Materials that cannot be reused or recycled should be disposed of at a properly permitted landfill.

Think before disposing of any household hazardous waste. Remember - The ocean starts at your front door.

The activities outlined in this fact sheet target the following pollutants:

| | |
|---------------------------|---|
| Sediment | |
| Nutrients | |
| Bacteria | |
| Foaming Agents | x |
| Metals | x |
| Hydrocarbons | x |
| Hazardous Materials | x |
| Pesticides and Herbicides | x |
| Other | x |



RECYCLE
USED OIL

Required Activities

- Dispose of HHW at a local collection facility. Call (714) 834-6752 for the household hazardous waste center closest to your area.
- Household hazardous materials must be stored indoors or under cover, and in closed and labeled containers.
- If safe, contain, clean up, and properly dispose all household hazardous waste spills. If an unsafe condition exists, call 911 to activate the proper response team.

Recommended Activities

- Use non-hazardous or less-hazardous products.
- Participate in HHW reuse and recycling. Call (714) 834-6752 for the participating household hazardous waste centers.

The California Integrated Waste Management Board has a Recycling Hotline (800) 553-2962, that provides information and recycling locations for used oil.

For additional information contact:

County of Orange, **OC Watershed**

Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL

or visit our website at: www.ocwatersheds.com



R-8 WATER CONSERVATION

Excessive irrigation and/or the overuse of water is often the most significant factor in transporting pollutants to the storm drain system. Pollutants from a wide variety of sources including automobile repair and maintenance, automobile washing, automobile parking, home and garden care activities and pet care may dissolve in the water and be transported to the storm drain. In addition, particles and materials coated with fertilizers and pesticides may be suspended in the flow and be transported to the storm drain.

Hosing off outside areas to wash them down not only consumes large quantities of water, but also transports any pollutants, sediments, and waste to the storm drain system. The pollution prevention activities outlined in this fact sheet are used to prevent the discharge of pollutants to the storm drain system.

Think before using water. Remember - The ocean starts at your front door.

Required Activities

- Irrigation systems must be properly adjusted to reflect seasonal water needs.
- Do not hose off outside surfaces to clean, sweep with a broom instead.

Recommended Activities

- Fix any leaking faucets and eliminate unnecessary water sources.
- Use xeriscaping and drought tolerant landscaping to reduce the watering needs.
- Do not over watering lawns or gardens. Over watering wastes water and promotes diseases.
- Use a bucket to re-soak sponges/rags while washing automobiles and other items outdoors. Use hose only for rinsing.
- Wash automobiles at a commercial car wash employing water recycling.

| The activities outlined in this fact sheet target the following pollutants: | |
|---|---|
| Sediment | x |
| Nutrients | x |
| Bacteria | x |
| Foaming Agents | x |
| Metals | x |
| Hydrocarbons | x |
| Hazardous Materials | x |
| Pesticides and Herbicides | x |
| Other | x |

| | |
|---------------------------|---|
| Sediment | x |
| Nutrients | x |
| Bacteria | x |
| Foaming Agents | x |
| Metals | x |
| Hydrocarbons | x |
| Hazardous Materials | x |
| Pesticides and Herbicides | x |
| Other | x |

For additional information contact:
County of Orange, **OC Watershed**

Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL
or visit our website at: www.ocwatersheds.com

Site Design & Landscape Planning SD-10



Design Objectives

- ☒ Maximize Infiltration
- ☒ Provide Retention
- ☒ Slow Runoff
- ☒ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.



SD-10 Site Design & Landscape Planning

Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.
- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.
- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

Site Design & Landscape Planning SD-10

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of "redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

SD-10 Site Design & Landscape Planning

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.



Rain Garden

Design Objectives

- ☒ Maximize Infiltration
- ☒ Provide Retention
- ☒ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☒ Contain Pollutants
- Collect and Convey

Description

Various roof runoff controls are available to address stormwater that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches: cisterns or rain barrels; dry wells or infiltration trenches; pop-up emitters, and foundation planting. The first three approaches require the roof runoff to be contained in a gutter and downspout system. Foundation planting provides a vegetated strip under the drip line of the roof.

Approach

Design of individual lots for single-family homes as well as lots for higher density residential and commercial structures should consider site design provisions for containing and infiltrating roof runoff or directing roof runoff to vegetative swales or buffer areas. Retained water can be reused for watering gardens, lawns, and trees. Benefits to the environment include reduced demand for potable water used for irrigation, improved stormwater quality, increased groundwater recharge, decreased runoff volume and peak flows, and decreased flooding potential.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain



barrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least 2 rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load. Several types of rain barrels are commercially available. Consideration must be given to selecting rain barrels that are vector proof and childproof. In addition, some barrels are designed with a bypass valve that filters out grit and other contaminants and routes overflow to a soak-away pit or rain garden.

If the cistern has an operable valve, the valve can be closed to store stormwater for irrigation or infiltration between storms. This system requires continual monitoring by the resident or grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering stormwater runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say 1/4 to 1/2 inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent, small storms.

Dry wells and Infiltration Trenches

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance.

In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Infiltration trenches function in a similar manner and would be particularly effective for larger roof areas. An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. These are described under Treatment Controls.

Pop-up Drainage Emitter

Roof downspouts can be directed to an underground pipe that daylight some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

OPERATIONS AND MAINTENANCE (O&M) PLAN

Water Quality Management Plan

For

Back Bay Landing

300 E. Coast Highway
Newport Beach, CA

APN 440-132-60

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | |
|--|--|--|--|
| BMP Applicable? Yes/No | BMP Name and BMP Implementation, Maintenance and Inspection Procedures | Implementation, Maintenance, and Inspection Frequency and Schedule | Person or Entity with Operation & Maintenance Responsibility |
| NON-STRUCTURAL SOURCE CONTROL BMPs | | | |
| Yes | <p>N1. Education for Property Owners, Tenants and Occupants</p> <p>Educational materials and training will be provided to property owners, residents and tenants, including education materials and restrictions to reduce pollutants from reaching the storm drain system. Materials are listed in Section VII and available in Appendix C.</p> | <p>Educational materials will be provided to tenants annually. Materials to be distributed are found in Appendix C of this WQMP. Tenants will be provided these materials by the Property Management prior to occupancy and annually thereafter.</p> <p><u>Frequency:</u> Annually</p> | POA |
| Yes | <p>N2. Activity Restrictions</p> <p>The owner shall develop activity restrictions (via CC&Rs or equivalent) that include language to restrict activities that have the potential to create adverse impacts on water quality. Activities include but are not limited to: the handling and disposal of contaminants, trash management and litter control, irrigation and landscaping practices, fertilizer applications and household waste management practices, prohibition of vehicle washing on-site, prohibiting washing or hosing of walkways and driveways, etc.</p> | <p>The Owner will prescribe activity restrictions to protect surface water quality, through lease terms or other equally effective measure, for the property. Restrictions include, but are not limited to, prohibiting vehicle maintenance or vehicle washing.</p> <p><u>Frequency:</u> Ongoing</p> | POA |

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | |
|--|---|--|--|
| BMP Applicable? Yes/No | BMP Name and BMP Implementation, Maintenance and Inspection Procedures | Implementation, Maintenance, and Inspection Frequency and Schedule | Person or Entity with Operation & Maintenance Responsibility |
| Yes | N3. Common Area Landscape Management Management programs will be designed and implemented by the Owner/POA, which will maintain all the common areas within the project site (via landscape contractor). These programs will cover how to reduce the potential pollutant sources of fertilizer and pesticide uses, utilization of water-efficient landscaping practices and proper disposal of landscape wastes in accordance with city requirements. | Maintenance shall be consistent with City requirements. Fertilizer and/or pesticide usage shall be consistent with County Management Guidelines for Use of Fertilizers (OC DAMP Section 5.5) as well as City requirements. Maintenance includes mowing, weeding, and debris removal on a weekly basis. Trimming, replanting, and replacement of mulch shall be performed on an as-needed basis to prevent exposure of erodible surfaces. Trimmings, clippings, and other landscape wastes shall be properly disposed of in accordance with local regulations. Materials temporarily stockpiled during maintenance activities shall be placed away from water courses and storm drains inlets. <u>Frequency:</u> Monthly | POA |
| Yes | N4. BMP Maintenance The Owner/POA will be responsible for the implementation and maintenance of each applicable non-structural BMP, as well as scheduling inspections and maintenance of all applicable structural BMP facilities through its landscape contractor and any other necessary maintenance contractors. | Maintenance of structural BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP. Records of inspections and BMP maintenance shall be kept by the Owner and shall be available for review upon request. <u>Frequency:</u> Ongoing | POA |

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | |
|--|---|--|--|
| BMP Applicable? Yes/No | BMP Name and BMP Implementation, Maintenance and Inspection Procedures | Implementation, Maintenance, and Inspection Frequency and Schedule | Person or Entity with Operation & Maintenance Responsibility |
| No | N5. Title 22 CCR Compliance (How development will comply) | Not Applicable | |
| No | N6. Local Industrial Permit Compliance | Not Applicable | |
| No | N7. Spill Contingency Plan | Not Applicable | |
| No | N8. Underground Storage Tank Compliance | Not Applicable | |
| No | N9. Hazardous Materials Disclosure Compliance | Not Applicable | |
| No | N10. Uniform Fire Code Implementation | Not Applicable | |
| Yes | N11. Common Area Litter Control The POA will be responsible for performing trash pickup and sweeping of littered common areas on a weekly basis or whenever necessary. Responsibilities will also include noting improper disposal materials by homeowners and reporting such violations for investigation. | Litter patrol, violations investigations, reporting and other litter control activities shall be performed on a weekly basis and in conjunction with routine maintenance activities. <u>Frequency:</u> Weekly | POA |
| Yes | N12. Employee Training All employees of the POA and any contractors will require training to ensure that employees are aware of maintenance activities that may result in pollutants reaching the storm drain. | Educate all new employees/ managers on storm water pollution prevention, particularly good housekeeping practices, prior to the start of the rainy season (October 1). Refresher courses shall be conducted on an as needed basis. <u>Frequency:</u> Annually | POA |
| No | N13. Housekeeping of Loading Docks | Litter patrol, spill containment and maintenance of filters (filter type to be determined upon development of site plan). <u>Frequency:</u> On-going | |

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | |
|--|---|---|--|
| BMP Applicable? Yes/No | BMP Name and BMP Implementation, Maintenance and Inspection Procedures | Implementation, Maintenance, and Inspection Frequency and Schedule | Person or Entity with Operation & Maintenance Responsibility |
| Yes | N14. Common Area Catch Basin Inspection All private catch basins will be maintained and cleaned by the POA. All public catch basins will be maintained by the City of Newport Beach. These activities will be done prior to the rainy season, no later than October 1 st of each year. | Catch basin inlets and other drainage facilities shall be inspected after each storm event and once per year. Inlets and other facilities shall be cleaned prior to the rainy season, by October 1st each year. <u>Frequency:</u> Annually | POA |
| Yes | N15. Street Sweeping Private Streets and Parking Lots The POA shall be responsible for the street sweeping of all drive aisles and parking areas within the project quarterly, and prior to the rainy season, no later than October 1 st of each year. | Drive aisles & parking lots must be swept at least quarterly (every 3 months), including prior to the start of the rainy season (October 1 st). <u>Frequency:</u> Quarterly | POA |
| No | N16. Retail Gasoline Outlets | Not Applicable | |
| STRUCTURAL SOURCE CONTROL BMPs | | | |
| Yes | S1. Provide storm drain system stenciling and signage The developer will be responsible for the stenciling of all catch basins to include a legible message such as “No Dumping - Drains to Ocean” or an equally effective phrase. The Owner will be responsible for maintaining and replacement of signage when necessary. | Storm drain stencils shall be inspected for legibility, at minimum, once prior to the storm season, no later than October 1 st each year. Those determined to be illegible will be re-stenciled as soon as possible. <u>Frequency:</u> Annually | POA |
| No | S2. Design and construct outdoor material storage areas to reduce pollution introduction | Not Applicable | |

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | |
|--|---|--|--|
| BMP Applicable? Yes/No | BMP Name and BMP Implementation, Maintenance and Inspection Procedures | Implementation, Maintenance, and Inspection Frequency and Schedule | Person or Entity with Operation & Maintenance Responsibility |
| Yes | S3. Design and construct trash and waste storage areas to reduce pollution introduction All trash and waste shall be stored in containers that have lids or tarps to minimize direct precipitation into the containers. The site operator shall ensure trash is stored properly and does not come into contact with runoff. | Sweep trash area at least once per week and before October 1 st each year. Maintain area clean of trash and debris at all times. <u>Frequency:</u> Weekly | POA |
| Yes | S4. Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control The owner/operator will be responsible for the installation and maintenance of all common landscape areas utilizing similar planting materials with similar water requirements to reduce excess irrigation runoff. The owner/operator will be responsible for implementing all efficient irrigation systems for common area landscaping including but not limited to provisions for water sensors and programmable irrigation cycles. The irrigation systems shall be in conformance with water use efficiency guidelines. | In conjunction with routine maintenance activities, verify that landscape design continues to function properly by adjusting properly to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, weather, and day or night time temperatures. <u>Frequency:</u> Monthly | POA |
| No | S5. Protect slopes and channels and provide energy dissipation | Not Applicable | |
| No | S6. Dock areas | Litter patrol, spill containment and maintenance of filters (filter type to be determined upon development of site plan). <u>Frequency:</u> On-going | |
| No | S7. Maintenance bays | Not Applicable | |
| No | S8. Vehicle wash areas | Not Applicable | |

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | |
|--|---|---|--|
| BMP Applicable? Yes/No | BMP Name and BMP Implementation, Maintenance and Inspection Procedures | Implementation, Maintenance, and Inspection Frequency and Schedule | Person or Entity with Operation & Maintenance Responsibility |
| No | S9. Outdoor processing areas | Not Applicable | |
| No | S10. Equipment wash areas | Not Applicable | |
| No | S11. Fueling areas | Not Applicable | |
| No | S12. Hillside landscaping | Not Applicable | |
| Yes | S13. Wash water control for food preparation areas All wash water from food prep areas will be controlled and proper staff training conducted by the site operator. Food preparation facilities shall meet all health and safety, building and safety and any other applicable regulations, codes requirements. | Food preparation areas will be inspected on a regular basis to ensure proper waste disposal and water usage procedures. Any grease interceptors shall be inspected and maintained in accordance with manufacturer's recommendations (typically quarterly). <u>Frequency:</u> Quarterly | POA |
| No | S14. Community car wash racks | Not Applicable | |

Any waste generated from maintenance activities will be disposed of properly. Wash water and other waste from maintenance activities is not to be discharged or disposed of into the storm drain system. Clippings from landscape maintenance (i.e. prunings) will be collected and disposed of properly off-site, and will not be washed into the streets, local area drains/conveyances, or catch basin inlets.

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | |
|---|---|--|
| BMP Name and BMP Implementation, Maintenance and Inspection Procedures | Implementation, Maintenance, and Inspection Frequency and Schedule | Person or Entity with Operation & Maintenance Responsibility |
| LOW IMPACT DEVELOPMENT BMPs | | |
| Bioretention with Underdrains Bioretention cells with underdrains are plant-based biotreatment systems that typically consist of a ponding area, mulch layer, planting soils and plants. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded and sequestered by the soil and plants. Underdrains collect the treated water and return it back into the storm drain system. | Inspections should occur semi-annually or after major storm events to check for the following and remove accordingly: standing water, sediment, and trash & debris. Inspections should also look for potential clogging and clean planters or, if necessary, replace the entire filter bed. Inspect for weeds, and prune and/or replace plants in accordance with routine landscape maintenance activities. Replace mulch and prune shrubs as necessary. <u>Frequency:</u> 2x per year | POA |
| Proprietary Biotreatment Filterra® units by Americast are structural media filtration device that also utilize bioretention processes for storm water treatment (functional equivalents are also acceptable). Filterra units feature a specially designed media filter mixture within a below-grade concrete box. One tree or large shrub is planted within the media to provide additional pollutant removal, and function similar to bioretention cells. The filter media is designed to capture and filter pollutants during the first-flush storm event, while biological processes degrade, metabolize, detoxify, and volatilize the pollutants during and between storms. | Annual maintenance consists of a minimum of two scheduled visits, one after the rainy season to clean up after the wet season, and one before the wet season to inspect and clean the unit. Each maintenance visit consists of the following: Inspection; removal of trash, debris, sediment; Filter media and plant health evaluation and replacement if necessary; replacement of mulch. <u>Frequency:</u> 2x per year | POA |

Required Permits

If a private entity retains or assumes responsibility for operation and maintenance of structural BMPs, the City shall be able access for inspection through a formal agreement.

Forms to Record BMP Implementation, Maintenance, and Inspection

The form that will be used to record implementation, maintenance, and inspection of BMPs is attached.

Recordkeeping

All records must be maintained for at least five (5) years and must be made available for review upon request.

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

[illegible]

Foundation Planting

Landscape planting can be provided around the base to allow increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of "redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Supplemental Information

Examples

- City of Ottawa's Water Links Surface –Water Quality Protection Program
- City of Toronto Downspout Disconnection Program
- City of Boston, MA, Rain Barrel Demonstration Program

Other Resources

Hager, Marty Catherine, Stormwater, "Low-Impact Development", January/February 2003.
www.stormh2o.com

Low Impact Urban Design Tools, Low Impact Development Design Center, Beltsville, MD.
www.lid-stormwater.net

Start at the Source, Bay Area Stormwater Management Agencies Association, 1999 Edition



Design Objectives

- ☒ Maximize Infiltration
- ☒ Provide Retention
- ☒ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.



- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
 - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
 - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
 - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
 - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of "redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.



Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☒ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include "NO DUMPING"



– DRAINS TO OCEAN” and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of “redevelopment”, then the requirements stated under “designing new installations” above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner’s association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.
- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☒ Contain Pollutants
- Collect and Convey



- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Additional Information***Maintenance Considerations***

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

APPENDIX D

BMP MAINTENANCE SUPPLEMENT

OPERATIONS AND MAINTENANCE (O&M) PLAN

Water Quality Management Plan

For

Back Bay Landing

300 E. Coast Highway
Newport Beach, CA

APN 440-132-60

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | |
|--|--|--|--|
| BMP Applicable? Yes/No | BMP Name and BMP Implementation, Maintenance and Inspection Procedures | Implementation, Maintenance, and Inspection Frequency and Schedule | Person or Entity with Operation & Maintenance Responsibility |
| NON-STRUCTURAL SOURCE CONTROL BMPs | | | |
| Yes | <p>N1. Education for Property Owners, Tenants and Occupants</p> <p>Educational materials and training will be provided to property owners, residents and tenants, including education materials and restrictions to reduce pollutants from reaching the storm drain system. Materials are listed in Section VII and available in Appendix C.</p> | <p>Educational materials will be provided to tenants annually. Materials to be distributed are found in Appendix C of this WQMP. Tenants will be provided these materials by the Property Management prior to occupancy and annually thereafter.</p> <p><u>Frequency:</u> Annually</p> | POA |
| Yes | <p>N2. Activity Restrictions</p> <p>The owner shall develop activity restrictions (via CC&Rs or equivalent) that include language to restrict activities that have the potential to create adverse impacts on water quality. Activities include but are not limited to: the handling and disposal of contaminants, trash management and litter control, irrigation and landscaping practices, fertilizer applications and household waste management practices, prohibition of vehicle washing on-site, prohibiting washing or hosing of walkways and driveways, etc.</p> | <p>The Owner will prescribe activity restrictions to protect surface water quality, through lease terms or other equally effective measure, for the property. Restrictions include, but are not limited to, prohibiting vehicle maintenance or vehicle washing.</p> <p><u>Frequency:</u> Ongoing</p> | POA |

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | |
|--|---|---|--|
| BMP Applicable? Yes/No | BMP Name and BMP Implementation, Maintenance and Inspection Procedures | Implementation, Maintenance, and Inspection Frequency and Schedule | Person or Entity with Operation & Maintenance Responsibility |
| Yes | <p>N3. Common Area Landscape Management Management programs will be designed and implemented by the Owner/POA, which will maintain all the common areas within the project site (via landscape contractor). These programs will cover how to reduce the potential pollutant sources of fertilizer and pesticide uses, utilization of water-efficient landscaping practices and proper disposal of landscape wastes in accordance with city requirements.</p> | <p>Maintenance shall be consistent with City requirements. Fertilizer and/or pesticide usage shall be consistent with County Management Guidelines for Use of Fertilizers (OC DAMP Section 5.5) as well as City requirements. Maintenance includes mowing, weeding, and debris removal on a weekly basis. Trimming, replanting, and replacement of mulch shall be performed on an as-needed basis to prevent exposure of erodible surfaces. Trimmings, clippings, and other landscape wastes shall be properly disposed of in accordance with local regulations. Materials temporarily stockpiled during maintenance activities shall be placed away from water courses and storm drains inlets.</p> <p><u>Frequency:</u> Monthly</p> | POA |
| Yes | <p>N4. BMP Maintenance The Owner/POA will be responsible for the implementation and maintenance of each applicable non-structural BMP, as well as scheduling inspections and maintenance of all applicable structural BMP facilities through its landscape contractor and any other necessary maintenance contractors.</p> | <p>Maintenance of structural BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP. Records of inspections and BMP maintenance shall be kept by the Owner and shall be available for review upon request.</p> <p><u>Frequency:</u> Ongoing</p> | POA |

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | |
|--|---|--|--|
| BMP Applicable? Yes/No | BMP Name and BMP Implementation, Maintenance and Inspection Procedures | Implementation, Maintenance, and Inspection Frequency and Schedule | Person or Entity with Operation & Maintenance Responsibility |
| No | N5. Title 22 CCR Compliance (How development will comply) | Not Applicable | |
| No | N6. Local Industrial Permit Compliance | Not Applicable | |
| No | N7. Spill Contingency Plan | Not Applicable | |
| No | N8. Underground Storage Tank Compliance | Not Applicable | |
| No | N9. Hazardous Materials Disclosure Compliance | Not Applicable | |
| No | N10. Uniform Fire Code Implementation | Not Applicable | |
| Yes | N11. Common Area Litter Control The POA will be responsible for performing trash pickup and sweeping of littered common areas on a weekly basis or whenever necessary. Responsibilities will also include noting improper disposal materials by homeowners and reporting such violations for investigation. | Litter patrol, violations investigations, reporting and other litter control activities shall be performed on a weekly basis and in conjunction with routine maintenance activities. <u>Frequency:</u> Weekly | POA |
| Yes | N12. Employee Training All employees of the POA and any contractors will require training to ensure that employees are aware of maintenance activities that may result in pollutants reaching the storm drain. | Educate all new employees/ managers on storm water pollution prevention, particularly good housekeeping practices, prior to the start of the rainy season (October 1). Refresher courses shall be conducted on an as needed basis. <u>Frequency:</u> Annually | POA |
| No | N13. Housekeeping of Loading Docks | Maintain area clean of trash and debris at all times. Additional details to be provided in Final WQMP once a site plan is developed. <u>Frequency:</u> On-going | |

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | |
|--|---|---|--|
| BMP Applicable? Yes/No | BMP Name and BMP Implementation, Maintenance and Inspection Procedures | Implementation, Maintenance, and Inspection Frequency and Schedule | Person or Entity with Operation & Maintenance Responsibility |
| Yes | N14. Common Area Catch Basin Inspection All private catch basins will be maintained and cleaned by the POA. All public catch basins will be maintained by the City of Newport Beach. These activities will be done prior to the rainy season, no later than October 1 st of each year. | Catch basin inlets and other drainage facilities shall be inspected after each storm event and once per year. Inlets and other facilities shall be cleaned prior to the rainy season, by October 1 st each year. <u>Frequency:</u> Annually | POA |
| Yes | N15. Street Sweeping Private Streets and Parking Lots The POA shall be responsible for the street sweeping of all drive aisles and parking areas within the project quarterly, and prior to the rainy season, no later than October 1 st of each year. | Drive aisles & parking lots must be swept at least quarterly (every 3 months), including prior to the start of the rainy season (October 1 st). <u>Frequency:</u> Quarterly | POA |
| No | N16. Retail Gasoline Outlets | Not Applicable | |
| STRUCTURAL SOURCE CONTROL BMPs | | | |
| Yes | S1. Provide storm drain system stenciling and signage The developer will be responsible for the stenciling of all catch basins to include a legible message such as "No Dumping - Drains to Ocean" or an equally effective phrase. The Owner will be responsible for maintaining and replacement of signage when necessary. | Storm drain stencils shall be inspected for legibility, at minimum, once prior to the storm season, no later than October 1 st each year. Those determined to be illegible will be re-stenciled as soon as possible. <u>Frequency:</u> Annually | POA |
| No | S2. Design and construct outdoor material storage areas to reduce pollution introduction | Not Applicable | |

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | |
|--|---|--|--|
| BMP Applicable? Yes/No | BMP Name and BMP Implementation, Maintenance and Inspection Procedures | Implementation, Maintenance, and Inspection Frequency and Schedule | Person or Entity with Operation & Maintenance Responsibility |
| Yes | S3. Design and construct trash and waste storage areas to reduce pollution introduction All trash and waste shall be stored in containers that have lids or tarps to minimize direct precipitation into the containers. The site operator shall ensure trash is stored properly and does not come into contact with runoff. | Sweep trash area at least once per week and before October 1 st each year. Maintain area clean of trash and debris at all times. <u>Frequency:</u> Weekly | POA |
| Yes | S4. Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control The owner/operator will be responsible for the installation and maintenance of all common landscape areas utilizing similar planting materials with similar water requirements to reduce excess irrigation runoff. The owner/operator will be responsible for implementing all efficient irrigation systems for common area landscaping including but not limited to provisions for water sensors and programmable irrigation cycles. The irrigation systems shall be in conformance with water use efficiency guidelines. | In conjunction with routine maintenance activities, verify that landscape design continues to function properly by adjusting properly to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, weather, and day or night time temperatures. <u>Frequency:</u> Monthly | POA |
| No | S5. Protect slopes and channels and provide energy dissipation | Not Applicable | |
| No | S6. Dock areas | Maintain area clean of trash and debris at all times. Additional details to be provided in Final WQMP once a site plan is developed. <u>Frequency:</u> On-going | |
| No | S7. Maintenance bays | Not Applicable | |
| No | S8. Vehicle wash areas | Not Applicable | |

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | | |
|--|---|---|--|
| BMP Applicable? Yes/No | BMP Name and BMP Implementation, Maintenance and Inspection Procedures | Implementation, Maintenance, and Inspection Frequency and Schedule | Person or Entity with Operation & Maintenance Responsibility |
| No | S9. Outdoor processing areas | Not Applicable | |
| No | S10. Equipment wash areas | Not Applicable | |
| No | S11. Fueling areas | Not Applicable | |
| No | S12. Hillside landscaping | Not Applicable | |
| Yes | S13. Wash water control for food preparation areas All wash water from food prep areas will be controlled and proper staff training conducted by the site operator. Food preparation facilities shall meet all health and safety, building and safety and any other applicable regulations, codes requirements. | Food preparation areas will be inspected on a regular basis to ensure proper waste disposal and water usage procedures. Any grease interceptors shall be inspected and maintained in accordance with manufacturer's recommendations (typically quarterly). <u>Frequency:</u> Quarterly | POA |
| No | S14. Community car wash racks | Not Applicable | |

Any waste generated from maintenance activities will be disposed of properly. Wash water and other waste from maintenance activities is not to be discharged or disposed of into the storm drain system. Clippings from landscape maintenance (i.e. prunings) will be collected and disposed of properly off-site, and will not be washed into the streets, local area drains/conveyances, or catch basin inlets.

| BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX | | |
|---|---|--|
| BMP Name and BMP Implementation, Maintenance and Inspection Procedures | Implementation, Maintenance, and Inspection Frequency and Schedule | Person or Entity with Operation & Maintenance Responsibility |
| LOW IMPACT DEVELOPMENT BMPs | | |
| Bioretention with Underdrains Bioretention cells with underdrains are plant-based biotreatment systems that typically consist of a ponding area, mulch layer, planting soils and plants. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded and sequestered by the soil and plants. Underdrains collect the treated water and return it back into the storm drain system. | Inspections should occur semi-annually or after major storm events to check for the following and remove accordingly: standing water, sediment, and trash & debris. Inspections should also look for potential clogging and clean planters or, if necessary, replace the entire filter bed. Inspect for weeds, and prune and/or replace plants in accordance with routine landscape maintenance activities. Replace mulch and prune shrubs as necessary. <u>Frequency:</u> 2x per year | POA |
| Proprietary Biotreatment Filterra [®] units by Americast are structural media filtration device that also utilize bioretention processes for storm water treatment (functional equivalents are also acceptable). Filterra units feature a specially designed media filter mixture within a below-grade concrete box. One tree or large shrub is planted within the media to provide additional pollutant removal, and function similar to bioretention cells. The filter media is designed to capture and filter pollutants during the first-flush storm event, while biological processes degrade, metabolize, detoxify, and volatilize the pollutants during and between storms. | Annual maintenance consists of a minimum of two scheduled visits, one after the rainy season to clean up after the wet season, and one before the wet season to inspect and clean the unit. Each maintenance visit consists of the following: Inspection; removal of trash, debris, sediment; Filter media and plant health evaluation and replacement if necessary; replacement of mulch. <u>Frequency:</u> 2x per year | POA |

Required Permits

If a private entity retains or assumes responsibility for operation and maintenance of structural BMPs, the City shall be able access for inspection through a formal agreement.

Forms to Record BMP Implementation, Maintenance, and Inspection

The form that will be used to record implementation, maintenance, and inspection of BMPs is attached.

Recordkeeping

All records must be maintained for at least five (5) years and must be made available for review upon request.

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

[illegible]

APPENDIX E

CONDITIONS OF APPROVAL

(pending – to be provided in Final WQMP)